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REPORT ON THE HARVEST RETURNS OF THE WHEAT AND OAT VARIETIES.

NORTHERN EXPERIMENTAL FIELDS, SEASON 1905.

F. E. Lee, Agricultural Superintendent.

By no means the least interesting and useful of the tests included in the Northern experimental fields during the past season is the section devoted exclusively to the trials of new and improved varieties of wheat and oats. Even the most casual observer must have been struck with the fact that some wheats show a preference to particular types of soil; some localities are best suited by early ripening varieties, other localities, again, are particularly fitted for the production of wheats of special kinds.

Under the circumstances which prevail at present, there is, unfortunately, far too little attention paid to the importance of maintaining seed wheat true to name and type.

Wheat, like any other seed, easily retrogrades; that is to say, loses those characteristics of grain and straw which distinguish it from other varieties. As a natural consequence, unless a change of seed is resorted to every few years, the same wheat constantly sown on the same land becomes more liable to disease and less able to withstand rigorous climatic extremes. The grading of seed is a matter that cannot be too strongly urged, if the vigour and vitality of the plant is to be maintained. Grading is, after all, only another aspect of the "survival of the fittest," and it is logical that only those seeds should be sown which are best fitted to reproduce their species. The ever-increasing confusion of nomenclature in wheats, engenders a danger which cannot be ignored, and the varieties grown on these experimental fields, will serve the very useful purpose of familiarizing farmers with the different appearance and habits of growth of varieties hitherto unknown to them.

Observation sheets were forwarded to each farmer, with the request that the most striking features of each variety might be recorded during the whole of the growing and ripening period. Where these notes have been faithfully kept, the accumulated data will be of great service in the future.

HARVEST RETURNS OF WHEAT AND OA

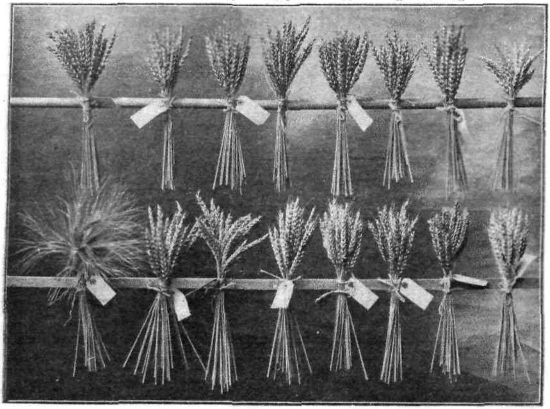
—	Waddy.	Majestic.	Bearded Intomerata.	Boomerang.	Silver King.	Terkin.	Fan.	Smart's Pioneer.	Steer's Early Purple Straw.	King's Early.	Petatz Surprise.	Gluyas.	Warrick.	*Marshall's No. 3.*	Newman's.	Leake's Rust Proof.	
	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	7
MALLEE AND MALLEE FRINGE.																	
Innes, D. B., Rainbow	7.0	15.0	12.2	9.2	15.0	7.8	18.8	11.1	15.0	14.0	12.2	15.6	10.4	12.1	12.6	10.0	13
Allen, Jas., Willenabrina	6.6	9.0	8.4	7.0	14.4	7.6	8.8	7.4	8.2	7.8	6.4	8.8	4.8	8.6	7.6	10.0	9
Witney, J. B., Jeparit	3.3	6.0	6.3	5.2	8.5	3.3	4.3	6.6	7.2	5.5	4.3	6.5	5.5	8.3	7.1	6.0	5
Milbourne, J., Warracknabeal ..	6.6	16.3	13.1	..	16.6	..	14.6	13.0	11.5	14.6	12.3	20.3	..	16.6	13.3	13.0	15
Bennett, J., Warracknabeal	3.4	9.6	5.1	5.8	10.0	4.0	7.6	4.6	1.8	3.8	4.0	6.0	4.1	5.3	5.3	4.0	7
Lavery, B., Watchem	6.3	12.6	9.0	9.7	13.3	6.6	11.3	12.3	11.8	10.1	8.3	7.8	6.6	11.1	10.0	10.1	12
Mudge, J., Sea Lake	7.8	10.0	11.1	8.6	15.0	8.6	17.0	11.3	7.6	14.3	13.0	11.6	9.3	10.5	10.8	10.6	13
Barber, A., Wycheproof	10.0	10.3	11.6	14.1	15.0	9.6	16.0	12.0	13.3	14.3	11.0	14.1	12.5	15.0	14.0	12.3	12
Williamson, W., Boort	*9.0*	*9.5*	*10.3*	*10.6*	*15.6*	*8.8*	*13.5*	*9.6*	*12.5*	*11.3*	*9.6*	*8.8*	*8.8*	*12.3*	*13.1*	*10.1*	*16*
Average yield per acre ..	7.5	10.9	9.5	8.7	14.1	9.2	12.4	9.7	9.8	10.9	9.0	11.0	7.7	11.0	10.4	9.5	11
WIMMERA DISTRICT.																	
Feery, J., Dimboola	8.6	18.1	15.5	12.6	24.8	11.3	14.3	13.3	13.0	13.1	9.8	13.0	10.1	20.3	16.8	18.3	19
Gibbins, E., Wail ..	10.0	18.0	14.3	14.1	21.8	11.1	16.8	13.6	13.5	14.0	12.6	13.8	12.5	16.6	14.3	14.3	18
Nowatna, C., Jung ..	6.6	17.1	11.5	11.6	17.6	9.1	16.6	12.6	13.0	12.6	11.5	8.5	8.0	11.8	12.5	11.5	19
Tepper, *Paul*, Coromby	6.3	16.1	7.8	6.1	20.0	8.0	10.3	10.5	7.5	7.1	7.5	9.6	9.1	12.0	8.8	10.6	20
Boyd, A., Minyip ..	7.8	10.6	8.0	7.0	11.6	5.6	10.0	7.8	7.6	7.6	8.5	9.6	5.0	11.0	8.0	6.3	13
Hutchings, A., Lubeck	10.3	14.6	11.6	14.6	14.3	11.3	11.0	11.6	10.3	12.3	11.3	9.6	8.3	12.6	10.6	9.6	13
Average yield per acre ..	8.2	15.7	11.4	11.0	18.3	9.4	13.1	11.5	10.8	11.1	10.2	10.6	8.8	14.0	11.8	11.7	17
NORTHERN AND *NORTH EASTERN.*																	
Sproat, W., Donald	12.7	20.6	7.0	15.5	19.5	15.4	24.8	18.4	14.7	20.5	14.9	15.6	16.8	18.1	18.0	10.1	15
Pollard, H., Glenloth	4.2	7.6	5.0	4.3	8.3	3.6	7.0	6.3	6.8	2.4	4.3	3.4	3.4	3.1	8.0	7.8	3
Nixon, Bros. Eddington	7.0	16.1	9.5	7.5	17.8	6.8	14.3	12.8	8.3	8.8	9.5	6.1	5.5	8.3	4.0	6.1	15
Howard, J., Bet Bet	5.0	9.6	3.3	5.5	8.8	5.0	5.0	8.0	2.0	3.8	4.6	5.6	4.0	6.0	4.6	3.3	11
Hunter Bros., Elmore	9.3	21.3	11.6	14.3	26.3	12.0	16.0	19.0	11.6	14.0	12.3	13.0	14.6	18.0	13.0	14.3	19
Bray, W., Merrigum	10.0	19.6	17.3	12.0	24.3	7.6	13.0	14.6	15.3	19.3	13.6	16.6	16.0	25.3	19.0	19.3	21
Sharp, T. R., *Goorambat*	10.5	25.3	16.1	13.5	29.8	12.1	16.0	16.8	14.5	16.1	16.5	14.6	17.0	24.8	18.1	24.5	24
Average yield per acre ..	8.3	17.1	8.9	10.3	19.2	8.9	13.7	13.7	10.4	12.1	10.8	10.7	11.0	14.8	12.1	12.2	15
Average yield for whole State	7.6	14.2	10.4	9.9	16.7	8.4	13.0	11.5	10.2	11.2	9.9	10.8	9.1	13.0	11.3	11.0	14

N Experimental Plots, Season 1905.

															Oat Varieties.						
Improved Steinwedel.	Steinwedel.	Nut Cut.	White Tuscan.	Outpost.	Ranji.	Farmer's Friend.	Jade.	Federation.	Schneider.	Hudson's Early Purple Straw.	Australian Talavera.	Tardent's Blue.	Sussex.	Kubanka.	Algerian.	Tartarian.	Dun.	Tasmanian Giant.	Stout White.	Hopton.	Black Norwegian.
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	98	99	100	101	102	103	104
1.6	14.6	16.6	14.3	15.3	4.3	14.8	17.0	14.8	13.1	17.3	12.6	12.3	15.3	10.8	11.4	12.6	9.6	21.0	14.0	13.2	12.0
6.6	5.8	6.0	11.0	7.2	4.2	11.2	12.6	10.6	10.0	10.2	10.6	10.2	10.4	8.0	18.5	10.0	10.5	13.0	9.7	9.0	6.5
7.2	4.1	5.8	6.8	6.6	2.5	4.6	8.4	7.5	6.3	6.6	7.8	5.0	6.6	3.8	28.3	28.5	25.5	21.0	21.0	21.0	18.0
7.6	14.0	12.8	13.0	8.6	8.0	12.3	14.6	14.3	9.0	10.1	12.0	13.0	16.3	10.3	27.5	18.0	20.5	27.5	23.0	19.0	18.5
0.1	9.6	9.6	9.6	4.5	4.5	4.3	10.0	12.0	9.3	11.6	8.8	7.7	10.3	6.0	16.2	15.2	16.0	21.2	16.0	18.5	18.0
6.1	13.4	13.7	12.5	5.3	7.5	12.0	20.5	19.1	13.0	17.0	14.3	14.6	16.7	13.0	21.2	10.2	7.5	13.8	10.0	7.7	8.5
3.6	13.6	14.3	15.5	13.5	7.6	16.0	19.8	16.1	14.3	16.3	14.0	9.5	13.8	12.5	21.2	5.0	5.5	6.0	9.5	6.2	6.5
7.1	14.2	17.8	16.3	15.6	12.0	12.3	17.3	18.5	13.0	16.6	17.1	12.3	15.5	14.6	31.0	16.0	17.5	24.0	20.2	18.5	17.5
0.5	20.6	19.5	11.6	13.1	10.0	13.1	19.6	19.5	16.1	16.3	15.1	13.8	15.9	11.1	17.5	15.1	10.3	21.7	16.5	14.7	11.7
3.3	12.2	12.9	12.2	9.9	6.5	11.1	15.5	14.7	11.5	13.5	12.4	10.9	13.4	10.0	21.4	14.5	13.6	18.8	15.5	14.2	11.9
8.8	12.8	17.6	23.3	14.1	9.1	19.8	21.8	23.5	14.0	20.8	18.3	16.1	21.1	14.8	31.0	22.0	18.0	30.7	25.0	18.0	16.2
.1	20.1	12.8	24.0	13.6	10.1	19.5	29.3	24.3	14.6	21.5	20.1	15.1	21.3	15.8	25.0	23.0	21.0	26.0	26.2	9.5	16.5
.8	17.5	18.3	20.6	11.3	7.6	10.8	24.8	26.8	16.3	23.3	22.5	17.1	21.3	17.5	24.5	26.7	28.5	45.5	36.2	30.2	25.2
.1	14.6	15.5	24.1	9.6	8.0	16.1	24.1	25.8	14.5	22.0	21.8	18.5	24.5	18.1	37.7	25.7	28.2	44.2	44.2	34.2	30.5
.8	15.3	15.1	15.6	8.0	5.3	11.6	15.6	14.3	11.8	16.3	14.3	13.8	17.3	15.6	25.7	21.5	26.1	26.0	25.0	23.5	25.0
.0	15.6	15.0	17.0	6.0	10.6	12.0	17.6	13.6	9.6	14.6	12.3	11.6	16.0	8.3	39.5	28.5	35.5	38.5	32.7	23.0	18.5
.9	15.9	15.7	20.7	10.4	8.4	14.9	22.2	21.3	13.4	19.7	18.2	15.3	20.2	15.0	30.5	24.5	26.2	35.1	31.5	23.0	21.9
.1	18.5	19.1	19.5	11.5	7.5	10.5	19.1	21.5	17.7	22.8	19.6	14.7	21.0	14.6	36.5	12.2	12.0	20.2	22.5	18.8	18.5
.3	9.4	8.3	9.2	4.6	5.0	8.6	11.1	11.2	8.0	8.9	8.1	8.1	11.7	5.4	20.0	11.5	11.5	17.6	14.0	16.3	16.3
.3	16.6	16.6	22.5	11.6	5.8	16.0	24.0	24.0	16.0	21.6	18.3	15.6	22.3	15.6	20.0	32.7	29.0	31.5	33.2	23.2	31.5
.0	6.5	11.3	11.6	3.3	5.3	4.3	12.3	13.0	6.0	12.0	11.8	9.6	12.6	8.3	16.5	19.5	17.5	20.5	22.5	19.0	20.5
.0	19.3	21.3	21.0	12.3	14.0	16.6	23.1	25.6	16.0	18.6	17.6	14.6	18.0	11.5	52	17.4	17.1	42.0	30.6	30.0	18.0
.3	26.3	22.8	21.6	22.0	10.0	18.8	28.5	28.0	19.0	27.0	22.0	18.0	27.6	18.0	42.5	49.0	20.0	55.5	52.0	49.0	49.0
.3	9.1	9.0	29.3	15.6	6.0	18.8	33.1	34.0	17.1	25.5	28.1	19.6	28.1	21.1	40.2	50.2	45.2	37.2	..	..	..
.4	15.1	15.4	19.2	11.5	7.6	13.0	21.6	22.4	13.4	19.4	17.9	14.3	20.1	13.5	32.5	27.5	21.7	32.0	29.1	26.0	25.6
.5	14.1	14.4	16.8	10.6	7.4	12.9	19.2	19.0	12.9	17.1	15.7	13.2	17.4	12.6	27.4	21.3	19.6	27.4	24.0	20.1	19.1

LOCALITIES FROM WHICH SEED WAS PROCURED.

Sixteen varieties of seed wheat were procured from Roseworthy Agricultural College, South Australia, four from Wagga and eight from Bathurst Experimental Farms, New South Wales; four from Dookie Agricultural College, Victoria; and six other varieties from reliable sources in Melbourne. In every case the variety was guaranteed true to name and type.



For the initial year of the experiment, it was considered, that in order not to rely too much on the experience of other States, and to guard against a possible alteration of the characteristics of each variety, under changed climatic and soil conditions, the best course to pursue was to keep each group together, hence no attempt was purposely made to classify the varieties into their order of ripening. My conception of an experiment is that nothing should be taken for granted, and by following out the course outlined above, the experiment provides in its first year a number of interesting facts which will be a guide for future development in this direction. Some little curiosity has been expressed at the reason why the late and early varieties were not kept separate, which, I trust, this explanation will remove. There is no more convincing proof of the differences which exist between wheat varieties than the spectacle of a number grown side by side with no attempt at classification.

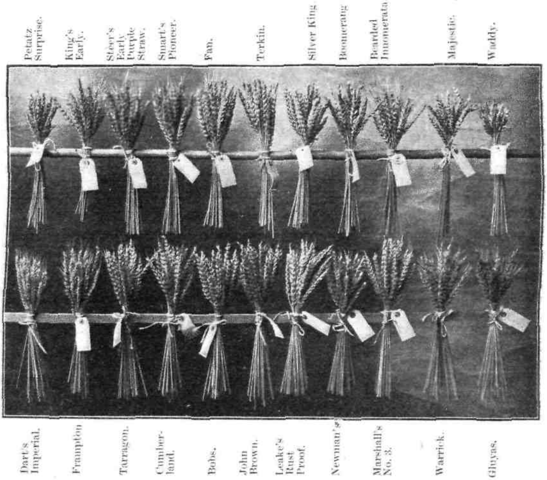
TREATMENT OF THE WHEAT VARIETIES.

All wheat varieties were pickled with sulphate of copper, or "bluestone," before being despatched from Melbourne. Seeding was, at the rate of 50 lbs. per acre. All the varieties received the same manurial dressing, viz. :—Ordinary superphosphate, at the rate of 56 lbs. per acre. On each farm all the varieties were sown the same day. Inequalities of soil were guarded against as far as possible, when the sites of the fields were originally selected. It may be fairly claimed, therefore, that all the varieties on the same field started with equal chances of success, and wherever there is a difference, it is directly traceable to the merits of the varieties themselves.

The above bald statement of the average yields of all varieties throughout the experimental area conveys little meaning unless accompanied by maximum and minimum yields. In order to facilitate easy comparisons, the varieties are set out below in the order of their average yields for all fields :—

No. of Plot.	Variety.	Maximum Yield.	Minimum Yield.	Average Yield.	No. of Plot.	Variety.	Maximum Yield.	Minimum Yield.	Average Yield.
		bush.	bush.	bush.			bush.	bush.	bush.
88	Jade	33·1	8·4	19·2	71	Marshall's No. 3	25·3	3·1	13·0
89	Federation	34·0	7·5	19·0	64	Fan	24·8	4·3	1·30
79	Dart's Imperial .. .	30·3	8·0	18·3	90	Schneider	19·0	6·0	12·9
94	Sussex	28·1	6·6	17·4	95	Kubanka	21·1	3·8	12·6
91	Hudson's Early Purple Straw	27·0	6·6	17·1	75	Bobs	25·5	2·3	12·4
84	White Tuscan	29·3	6·8	16·8	65	Smart's Pioneer	19·0	4·6	11·5
62	Silver King	29·8	8·5	16·7	72	Newman's	19·0	4·0	11·3
77	Tarragon	31·1	5·9	16·6	67	King's Early	20·5	2·4	11·2
81	Improved Steinwedel ...	26·3	6·6	16·5	73	Leake's Rust Proof ..	24·5	3·3	11·0
78	Frampton	30·1	6·8	15·7	69	Gluyas	20·3	3·4	10·8
92	Australian Talavera ..	28·1	7·8	15·7	85	Outpost	22·0	3·3	10·6
74	John Brown	24·8	3·0	14·5	60	Bearded Innomerata ..	17·3	5·0	10·4
83	Nut Cut	22·8	5·8	14·4	66	Steer's Early Purple Straw	15·3	1·8	10·2
59	Majestic	25·3	6·0	14·2	61	Boomerang	15·5	4·3	9·9
82	Steinwedel	26·3	4·1	14·1	68	Petatz Surprise	16·5	4·0	9·9
87	Farmer's Friend	19·8	4·3	13·4	70	Warrick	17·0	3·4	9·1
93	Tardent's Blue .. .	19·6	5·0	13·2	63	Terkin	15·4	3·3	8·4
76	Cumberland	22·3	5·0	13·2	58	Waddy	12·7	3·3	7·6
80	Manitoba	28·3	5·1	13·0	86	Ranji	14·0	2·5	7·4

One cannot study the maximum yields of each variety in the above list, without becoming convinced that there are any number of new wheats, well worthy of introduction into our Northern grain areas. Admitting that the wheat yields generally throughout the State, this past season, have been exceptionally good everywhere, there is still cause for congratulation in the knowledge that many of the new varieties, tried for the first time on a comprehensive scale, and under a wide range of soil and climatic conditions, have more than realized the happiest anticipations of them. Even the lowest maximum yield, No. 58, Waddy, has shown itself capable of producing over three bags per acre, a result that will be well up to the average of the State, as a whole. Judging by the very numerous inquiries from farmers since the returns of each field have appeared in the district press, there is ample evidence that the merits of some varieties have highly commended themselves, and the results of the first year of the Northern experiments will, without doubt, lead to a considerable expansion in the introduction of new seed.



WHEAT VARIETIES IN THE MALLEE AND MALLEE FRINGE.

The reader's attention is especially drawn to the average returns of the wheat varieties grown on soils classed as Mallee and Mallee Fringe. From Rainbow to Boort, may be claimed to include representative Mallee soils.

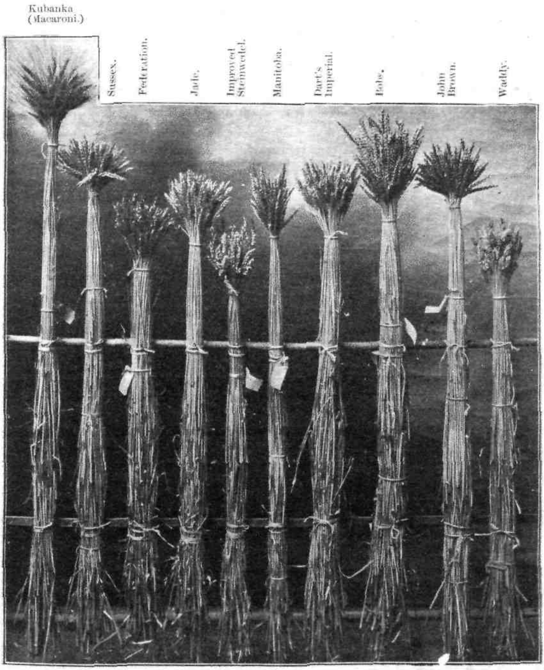
It will be noticed that the yields generally are below the general average for the State, but there are indications, nevertheless, that some varieties notably, Jade, Dart's Imperial, Federation, Improved Steinwedel, Sussex, Hudson's Early Purple Straw, Silver King, Nut Cut, Frampton, and others, are suited by the soil and climatic conditions prevailing in the Mallee.

The varieties which have given the poorest yields, viz. :—Ranji, Waddy, and Warrick, all under two bags per acre, it will be remarked, are also poor in other localities. The results of one year, however, must not be taken to be a proof of the general unsuitability of the varieties named to Northern Victoria. The returns of another season must first be ascertained before any variety can be accurately judged.

WHEAT VARIETIES IN THE WIMMERA DISTRICT.

Within the term Wimmera is included those fields in North-west Victoria, which are concentrated between the railway lines radiating from Murtoa. It will be noted that the yields generally in these districts are higher than in the Mallee, which was only to be expected, seeing the difference in soil and rainfall. The wheat varieties giving the highest yields are practically the same as in the Mallee, although in some cases there is a difference of over two bags per acre. The oat varieties have all done well,

notably the Tasmanian Giant White, Stout White, and the well-known Algerian. The two former are well suited for grain production, but cannot compare with the Algerian for hay purposes, on account of the coarseness of the straw. Farmers have been much attracted by the plump white oats for feeding purposes.



(The stems were cut equal heights from the ground.)

WHEAT VARIETIES IN THE NORTHERN AND NORTH-EASTERN PLAINS.

Some latitude must be allowed, to embrace Donald and Goorambat under this classification. In general terms the Northern plains include "timber" and "plain" land, and no attempt is made in this report to distinguish between them.

The yields of the wheat varieties has been generally good, and in many cases much above the general average of all fields. The same varieties show prominently in these districts, as in the Mallee and Wimmera, which may be taken as an indication of their powers of submitting to environment. The yield of the oat varieties is particularly encouraging, the familiar Algerian holding pride of place. It will be noted that on the farm of Mr. T. R. Sharp, at Goorambat, the Tasmanian Giant White produced 55½ bushels per acre, and the Stout White oat 52 bushels. These yields have raised the general average for the whole State.

CHARACTERISTICS OF THE WHEAT VARIETIES.

Farmers require to know something about the characteristics and habits of growth of wheat varieties, before deciding whether they would be suitable for their particular circumstances and local conditions. The following grouping of varieties will be found useful in affording the information necessary. The varieties are given according to the order in which they ripen :—

Variety.	Strength of Straw.	Stooling Quality.	Grain holding Quality.	Class of Head.	Period of Ripening.	Colour of Head.
Ranji	Fair	Poor	Good	Erect	Very early	White
Cumberland	Strong	Fair	,,	Slightly drooping	,,	,,
Waddy	Fair	,,	,,	Erect	,,	,,
Outpost	Weak	Poor	,,	,,	,,	,,
King's Early	,,	,,	,,	Slightly drooping	,,	Bearded white
Terkin	,,	,,	,,	,,	Early	White
Smart's Pioneer	Strong	Fair	Inclined to shake	,,	,,	,,
Gluyas	Fair	,,	Good	Erect	,,	Brown
Warrick	Strong	,,	,,	Slightly drooping	,,	,,
Improved Steinwedel	Fair	,,	Shakes slightly	,,	,,	White
Steinwedel	,,	,,	Shakes badly	,,	,,	,,
Nut Cut	Strong	,,	,,	,,	,,	,,
Majestic	Fair	,,	Good	,,	Medium	,,
Fan	Strong	Good	,,	,,	,,	,,
Steer's Early Purple	Fair	Poor	,,	,,	,,	,,
Newman's	Weak	,,	,,	Drooping	,,	,,
John Brown	,,	Fair	,,	Erect	,,	Brown
Bobs	,,	Poor	,,	,,	,,	White
Frampton	*Fair*	*Fair*	,,	,,	,,	,,
Farmer's Friend	Strong	Good	Shakes slightly	Slightly drooping	,,	,,
Federation	,,	,,	Good	,,	,,	,,
Schneider	,,	,,	Shakes badly	Erect	,,	,,
Hudson's Early Purple	Fair	,,	Shakes slightly	Slightly drooping	,,	,,
Australian Talavera	,,	,,	Good	,,	,,	,,
Sussex	Strong	,,	,,	Erect	,,	,,
Kubanka (Macaroni)	Weak	,,	,,	Drooping	,,	Bearded yellow
Silver King	,,	Fair	,,	Slightly drooping	Late	White
Boomerang	,,	Poor	,,	,,	,,	,,
Bearded Innomerata	,,	,,	,,	,,	,,	Bearded white
Petatz Surprise	,,	,,	,,	Erect	,,	White
Marshall's No. 3	,,	,,	,,	Slightly drooping	,,	,,
Leake's Rust Proof	,,	,,	,,	Drooping	,,	,,
Tarragon	Poor	,,	,,	Erect	,,	,,
Dart's Imperial	Fair	,,	,,	,,	,,	,,
Jade	Strong	Good	Inclined to shake	Slightly drooping	,,	,,
Manitoba	Poor	Fair	Good	Erect	,,	,,
Tardent's Blue	Strong	Good	,,	Slightly drooping	,,	,,
White Tuscan	,,	,,	,,	Erect	,,	,,

The above classification of the wheat varieties must not be taken as being absolutely binding. For example, there are degrees of earliness and lateness in ripening and what might be very early in one locality might be early or even medium in another.

The list merely indicates whether the varieties are early, medium, or late, without regard to districts. Further trials will show possible modifications in the dates of ripening.

OAT VARIETIES.

The inclusion of seven varieties of oats in the variety section of the Northern fields has produced some interesting returns, as follow:—

	Bushels per Acre.						
—	Algerian.	Tartarian.	Tasmanian Giant White.	Stout White.	Hopton.	Dun.	Black Norwegian.
Average of the Mallee and Mallee Fringe ...	21·4	14·5	18·8	15·5	14·2	13·6	11·9
Average of the Wimmera	30·5	24·5	35·1	31·5	23·0	26·2	21·9
Average of the North and North-Eastern Plains	32·5	27·5	32·0	29·1	26·0	21·7	25·6
Average for the Whole State ...	27·4	21·3	27·4	24·0	20·1	19·6	19·1

The well-known Algerian oat, it will be remarked, has held its own well. The only varieties to compare with it in yield being the Tasmanian Giant White and Stout White Oats.

The Algerian is the earliest variety to ripen, the next being the Tasmanian Giant White, followed by the Black Norwegian, Dun, Hopton, Stout White, and Tartarian, in that order. Both the Tasmanian Giant White and the Stout White oats are coarse in the straw, and less suited for chaffing than the other varieties. The Dun oat is a very slow grower during the winter, and has a tendency to creep on the ground, which trait has not made it a favourite.

The Hopton and Black Norwegian oats are dark in colour, and have not the same attractive appearance as the more plump and whiter varieties.

GENERAL SUMMARY.

What the farmer wants to know, in as few words as possible, is: What have the trials of the wheat and oat varieties taught him?

The answer may be briefly set out as follows:—

(*a*) That there are a number of varieties, which might with advantage be introduced in order to bring about a change of seed.

(*b*) That some of these varieties have special characteristics of straw, grain, or habit of growth which make them particularly suitable for conditions prevailing in certain localities.

(*c*) That some varieties by reason of their earliness or lateness of ripening, would not coincide with the harvest of other varieties, thus preventing prompt marketing of the grain, and causing a prolonged harvesting season.

(*d*) That some of the varieties grown possess better milling qualities and contain a better percentage of flour-making material than others, which should give them an added value in the eyes of the miller, and will probably lead to the payment of a better price per bushel, where such wheats are systematically grown.

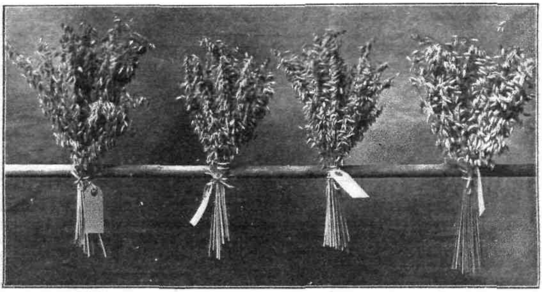
(*e*) That the bearded wheats are difficult to strip.

(*f*) That during the past season the very earliest wheats have been the poorest in yield. Further trial is necessary to confirm or disprove this point.

(*g*) That of the oat varieties tried, there are none which offer superior attractions to the Algerian as a hay crop.

(*h*) That for grain, the Tasmanian Giant White and the Stout White oats have much to recommend them.

When discussing the yields and characteristics of the wheat and oat varieties, the farmer must consider that the varieties themselves have not, perhaps, had the opportunity of showing to the best advantage during the past year. It is intended to sow only wheat varieties during the coming season, and special efforts will be made to enlarge the scope of the present investigations. The merits of a variety can only be fairly judged when at least two years' results are at hand.



Black Norwegian. Hopton. Stout White. Tasmanian Giant White.

POULTRY REMINDERS.

H. V. Hawkins, Poultry Expert and Lecturer.

Eggs that are not gathered daily at this time of the year (if fertile) go off immediately.

By keeping the male bird away, the eggs keep fresh twice the length of time.

This is the time to dispose of all old hens; it will not pay to keep them ten weeks during feather-making only. Always bear in mind that the older the hen, the longer she will take to moult, and to commence to lay. I have known hens seven years old to lay 13 eggs in 12 months; that won't pay.

Make up your mind to keep a breed and determine to master that breed.

Farmers having incubators and brooder houses should now open them up to allow plenty of air and sunshine. This is a safety valve for next season's work of hatching.

Remember that an egg contains more than 70 per cent. of water, hence the necessity of clean water for your stock.

How can people allow their fowls to drink the filth in the back yards of our crowded suburbs? Yet it is a common occurrence.

Dairymen are called to account for this offence. Is it not time that the haphazard, dirty, poultry keeper should likewise be taught a lesson on cleanliness.

Poultry breeding must be worked on regular and careful lines if you aim at success.

Every day brings with it its little worries and great patience is required by every poultryman.

Show the birds kindness, and they will become quite tame and more manageable.

Keep the drinking water out of the sun. If this is neglected, cholera may cause you serious loss.

Vegetables form the most important part of the summer diet; use raw, and cut finely, or suspend about 2 feet from the ground. This will give exercise to those in small pens, and will keep down fat.

Note.—Eggs are not only used in the kitchen, but millions of dozens are used in the manufacture of goods, and each year we find a new industry launched for which tons of eggs are used. Think, for a moment, of the enormous increase in the illustrating of our journals—by the half-tone system—now in use throughout the world. Each illustration block requires the use of the hen's egg.

SEPARATE THE SEXES.

The male bird should now be kept by himself. He requires a varied diet whilst moulting the old feathers out.

You may assist him by pulling out the two top and the under sickles, as they are the most troublesome to him.

See that a fourth of his meal consists of raw vegetables, and a little fresh meat regularly. Add a teaspoon of raw linseed to the morning meal.

Feathers are formed from similar (nitrogenous) material to that which produces the hen's egg.

The more range the hens have after their year's work, the better will they moult, and the stronger will the early chicks be.

PROFIT WITH TWO HENS.

During the year ending 31st December, 1905, two pullets that were hatched in August, 1904, commenced to lay on 30th March and finished with an average egg return of 20 each month for nine months, or 360 eggs in all, which realized an average return of 1s. per dozen, or 30s. the lot.

The cost of feed amounted to 10s. 10d., which included pollard, bran, meat, pea-meal, barley, and vegetables. They were kept in a shed 10 ft. x 12 ft., with no grass, but ample supplies of green lucerne, thistles, raw onions, &c., chaffed fresh each day.

These two pullets were a first cross of Silver Wyandotte and Silver Dorking, the progeny of a magnificent laying strain.

DISEASES OF FARM ANIMALS.

S. S. Cameron, M.R.C.V.S.

II. GENERAL INDICATIONS OF DISEASE (*continued*).

TEMPERATURE.

Internal Temperature.—The standard of internal temperature of the various domestic animals has been carefully observed in both northern and southern hemispheres, and a consensus of records shows that under the same conditions of sun and shade temperature the internal temperature of animals in Australia does not vary from the European standard. During the prevalence of high sun temperature, however, such as sometimes persists for days or weeks on end in Australia, it may rise as much as a degree. Interesting evidence on this point, which supports the author's observations on animals, was obtained as regards man by Dr. Gresswell during successive voyages through the tropics.

The internal temperature of animals as of man is subject to slight increase towards the evening, but this is less likely to be due to the "heat of the day" than to its "burden," in that during the day the movements of the animal and its activity in foraging are productive of greater tissue change than occurs during the placid hours of the night. In horses at work the morning fall of temperature is not so constant, but a rise of temperature in the evening of from 1 degree to 1½ degrees F. over the morning record may always be relied upon in both horses and cattle at pasture. This is a point of great importance to bear in mind when temperatures are being taken at successive intervals for comparison. In the interpretation of the temperature record during the application of the tuberculin test to cattle it is necessary to take this evening rise into account when comparing morning and evening temperature, otherwise, when the tuberculin-injection has been done at early morning, the natural evening rise of perhaps a degree and a half might be mistakenly interpreted as a reaction and a consequent error in diagnosis made. It is always wiser to carry out the tuberculin-injection in the evening and to use the evening temperature as a standard from which to estimate a re-acting rise, in which case the cow is given the benefit of the fall towards morning which may naturally be expected.

In animals the temperature is usually taken by inserting a clinical thermometer into the rectum in males or vagina in females in such manner that the mercury bulb reaches 2 or 3 inches inside. When using the thermometer in the rectum care should be taken, by back-raking, if necessary, to have it empty, otherwise the bulb of the thermometer might be enveloped in a mass of fœces at a temperature considerably lower than that of the body. Various so-called veterinary thermometers have been at different times placed on the market with devices supposed to prevent breakage and to facilitate their use on restless animals; but, on the whole, the ordinary clinical thermometer used in human practice is to be preferred. The ordinary thermometer requires to remain in position some three minutes before the mercury will register the highest limit, but much time is saved if the quick registering, but slightly more expensive, "half-minute" thermometer is used. A new thermometer, if not purchased with a Kew certificate of correctness, should always before use be first tested with one known to register accurately.

I desire to here record my experience that after a thermometer has been used on, say, 40 or 50 animals in quick succession, it will be found to register a degree or more higher than another that has not been so continuously used, both thermometers having, prior to use, been tested, and found to register alike. After a period of non-use the high-registering thermometer will again register accurately. I was at first inclined to believe that the high registering under the circumstances resulted from the expansion of the glass, arguing that, as under the influence of heat it would expand in all directions, the lumen of the thermometer would be diminished in calibre, and the column of mercury would consequently rise higher; but Mr. Baracchi, the Victorian Government Astronomer, to whom the matter was submitted for elucidation, while not desirous of being finite on the point, is of opinion that the phenomenon is more likely due to some molecular change in the mercury, as a result of it being kept in a continuous state of agitation by the alternate heating and shaking to which it is subjected during use, and "knocking down" between times.

With the reservations that the temperature is usually higher—

(*a*) In the mornings than in the evenings.
(*b*) In young animals than in mature ones.
(*c*) In animals of "nervy" temperament than in sluggish animals
(*d*) In animals living in the open than in those stabled.
(*e*). In well-fed animals than in poorly-fed ones.
(*f*) After clipping (horses) and shearing (sheep).
(*g*) During digestion and after exercise or excitement.
(*h*) In the male than in the female, except when in season,

the normal standard of temperature in the different domestic animals is as follows:—

Horse, 100·0 to 101·0° F.
Cow, 101·5 to 102·5° F.
Sheep, 103·5 to 104·5° F. (as low as 101·0° after shearing).
Pig, 103 5 to 104·5° F. (very variable).
Dog, 100·0 to 103·0° F. (varies with external temperature).
Fowl, 105·0 to 108·0° F.

Increase of temperature to the extent of two, three, or more degrees above these averages is an indication of the existence of fever, and such increase is often the first ascertainable evidence of the onset of infective and contagious diseases, such as strangles in horses and pleuro-pneumonia in cattle. On the other hand, the temperature is not a reliable criterion in such slow-developing diseases as tuberculosis, in which it is apt at times to be very erratic. After the persistence of high temperature a gradual fall evidences a decline of the fever and a tendency to recovery, but a sudden marked fall in such cases is indicative of "collapse," and is often the precursor of death. A temperature below normal is observed in milk fever, and other diseases in which the brain is affected, and also in diseases of a debilitating or typhoidal type.

External Temperature.—The surface temperature of the body should be uniform to the touch at all parts. The ears, horns, feet, and shanks are slightly cooler than the rest of the body; but here, also, the degree of warmth should be uniform. In the early stages of inflammatory and febrile diseases, the extremities may be cold, or sometimes the ears may be hot and the legs cold, or *vice versâ*. Such conditions, as also coldness of the surface of the body either all over or in parts, and of the expired air, is indicative of faulty or ill-balanced blood circulation, and should suggest the administration of stimulants and the clothing or brisk grooming of the body. They may also be premonitory of that deathly coldness which

precedes a fatal termination. Hand-rubbing of the legs, and bandaging with either woollen bandages or straw ropes, together with pulling friction of the ears, sometimes have a wonderful effect in restoring equilibrium of circulation without the aid of medicinal stimulants.

SECRETIONS.

PERSPIRATION.—Excessive perspiration, when not due to palpable cause, such as unwonted exercise or excitement, usually accompanies increase of body temperature, and is an indication of fever. It involves an increased functional activity on the part of the sweat glands of the skin (sudoriferous glands) and assists in the abstraction of animal heat, not only because moisture is a good conductor of heat, but also by reason of the fact that heat is necessary for the evaporation or drying of perspiration, and it is consequently radiated or given off in greater amount after profuse sweating. The "cold sweats" to which horses are subject also occur in fever when there is a rush of blood to some internal organ, and they serve to prove that excessive perspiration does not necessarily depend upon an engorged condition of the blood vessels of the skin, but is rather brought about by glandular activity, the result of nerve stimulus. Sweating in patches is seen only in the horse and the "breaking out into a sweat," which may occur two or three times after being rubbed dry after work is also peculiar to horses. It is interesting to note that the horse is the only domestic animal, in fact, the only animal entirely covered with hair that sweats naturally over all the surface parts of the body. Cattle sweat through the muzzle; dogs and cats through the foot-pads, and from the tongue, and the pig from the skin of the snout only.

Nasal Discharges.—The abnormal discharges from the nostril are often of such a distinctive character as to be of use in diagnosis. In nasal gleet the discharge is thick and white, and sometimes curdled, while in glanders it is thin and sticky, of a pearly grey colour, and sinks in water. In either disease it may be fœtid or not, according to whether the ulceration from which it proceeds has extended to the bone or not. In influenza the discharge varies in successive stages of the disease. It may be catarrhal (watery), mucoid, muco-purulent (mucus and pus) and purulent. In anthrax the discharge from the nostrils may be black or yellow (citron-coloured). In pneumonia it is charged with changed blood pigments, and is rusty coloured. In catarrhal pneumonia it may be muco-purulent, and in croupous pneumonia amber-coloured and viscid. In suffocative bronchitis the discharge is frothy, bloody, and profuse. In bleeding from the nose, the bloody discharge varies according to the seat of the hemorrhage. If from the nostrils (epistaxis) it is clear, unmixed non-frothy blood; if from the lungs (hoemoptysis) it is bright scarlet in colour, mixed with froth and mucus, and may be accompanied with a cough; and if from the stomach, it is dark-coloured from the action of the acid of the gastric juice with which it is mixed.

Other Secretions.—The secretion of the various organs and tissues of the body are liable to be altered during the progress of disease. They may be—

(1) *Diminished.*—As in the early stages of a febrile disease, such as pleurisy, when the pleural surfaces become dry and give rise to the "friction sound" heard on auscultation.

(2) *Increased.*—The increase of one secretion which usually occurs when others are diminished is well seen in milk fever in cows, when along with suspension of the milk function there is a corresponding increase of urine secretion.

(3) *Perverted.*—When a secreting organ, such as the liver, is diseased the chemical composition of its special secretion is frequently altered. In some cases one set of organs takes on the function of another. For example, the kidneys commonly take on the function of expelling bile from the blood when, either from disease of the liver, or from obstruction of its ducts, the bile is not being got rid of in the orthodox way. Similarly, when the function of the kidneys is suspended a condition of uræmic poisoning is set up in the system, and this is frequently relieved by a compensating increase of activity of the skin glands, by means of which the urea and other waste matter circulating in the blood are got rid of through the perspiration.

EXCRETIONS (FŒCES AND URINE).

Fæces.—The condition of the bowels, as evidenced by their frequency of movement, and by the character of the dejecta (fœces) is a guide of such importance in the diagnosis of disease that inquiry and examination regarding it should never be neglected. The average daily movements of the bowels (defœcation) have already been given, and the normal characters of the dejecta have also previously been described (see page 20). Any variation in colour, smell, consistence and composition, and the presence of foreign bodies, worms, whole grain or undigested food-particles, should be noted and rational inferences drawn therefrom. Darkened colour and foul smell are often associated with *constipation* or bowel-sluggishness. Hardness and sliminess of the fœces point to catarrh of the large bowels, and suggest the administration of oleaginous laxatives. The presence of undigested grain or other foodstuffs should suggest an examination of the teeth and mouth. If present in large proportion, and accompanied by abdominal uneasiness, a "gorging" of the particular food that is undigested may be suspected, and steps should be taken to avert an attack of inflammation of the bowels or of laminitis.

Diarrhœa should not always be treated with astringent or binding medicine. It is frequently due to the presence of irritating bowel contents, the removal of which should be facilitated by the giving of gentle purgatives. Conversely, purgative medicines in constipation are at times harmful. In paralysis of the bowels there is constipation, accompanied oftentimes by abdominal rumblings, indicating the presence of gases and fluid. Such cases should be treated with tonics and nerve stimulants rather than with purgatives, which may increase the mischief.

The Urine is scanty and usually high-coloured in febrile conditions. The presence of an excess of sediment, except it is long-continued, is not necessarily a sign of disease. The urine may be tinged with blood in congestion or inflammation of the bladder, and if pain is evinced on passing it, some irritation of the urinary passages may be inferred. In redwater and azoturia the change of colour depends upon the presence of quantities of the dissolved colouring matter of the blood. In some forms of jaundice and other diseases of the liver, the kidneys take on the function of excreting from the blood more than their ordinary share of effete

material, and the urine is often heavily charged with bile or bile salts and colouring matter. Errors in diet often cause increased secretion of urine, perhaps the most familiar example being the feeding of musty hay. Potash salts or food which is rich in them, such as oats and grasses, always give rise to the elimination of an excess of soda salts in the urine, and consequently when such foods are habitually used the animal should always be allowed access to common salt *ad lib.*, or should have it mixed in the food, so that the waste of salt from the blood may be made good.

FEVER.

Fever is an abnormal condition of the system characterized primarily by an undue elevation of temperature, but also by the proportionately increased frequency of the pulse and respiration, by diminution of the secretions—urine, saliva, sweat, milk, intestinal juices, mucus, bile, &c.—and by perversion of nerve force. In infectious diseases fever succeeds on the termination of the *period of incubation*, by which is meant the time which elapses between the contracting of infection and the first manifestation of symptoms, during which the disease is "brewing," so to speak.

In fever there is a disturbance of that equilibrium naturally existing between the production and loss of heat by which the normal balance of temperature is maintained. This disturbance consists in an increased production of heat, and consequent rise of temperature. Evidence of the tissue combustions, which accounts for the increased production of heat, is seen in the rapid emaciation and increased elimination of the products of oxidation of the tissues—urea, uric acid, carbonic acid gas, &c.—which usually accompany a condition of fever.

During fever certain symptoms are observed which will be referred to throughout as *febrile symptoms*. These may be grouped under three headings, according as they are associated with the three stages of fever—the attack, the crisis, and the decline. Those of the *first*, or "cold stage" are—rigors or "chills" or shivering fits, crouching attitude, arching of the back, coldness of the skin and extremities, due to contraction of the arteries of the skin, and the internal determination of blood, which is also manifested by rise of internal temperature, pulse and respiration. In the *second*, or "hot stage" of fever, which lasts longer than the first, the last-mentioned three symptoms are maintained or increased, and are accompanied by dulness, loss of energy, and appetite (and rumination in cattle), and a hot dry skin—the reaction from the previous coldness. Later, the skin is bathed in perspiration; the legs and ears, and in cattle the horns, and dogs the nose, are excessively hot; the urine is scanty and high-coloured, and there is constipation, thirst, dryness of throat, mouth and tongue, cessation of milk secretion in lactating animals, and injection (redness) of the visible mucous membranes. These symptoms may be succeeded by more specific symptoms of some special disease, febrile symptoms being often premonitory to an attack of more serious disease of an infectious or inflammatory type. When the decline of fever commences—the so-called *third stage*—the above mentioned symptoms gradually abate, and the return to a normal state is expedited if the animal is rested in a well-ventilated box free from draughts, the body comfortably clothed, and the legs bandaged. The food should consist of mashes, gruels, and greenstuff, and saltpetre or chlorate of potash in half-ounce doses may be given in the mash or drinking water twice a day.

CLOSER SETTLEMENT STUDIES.

Australia Felix.

R. Crowe, Superintendent of Exports.

Christmas-time—cool stores full of produce—meat and rabbit exporters, butchers, and rabbit trappers all gone on holidays—arrangements made for discharging shipments on Christmas and following days; yielding to the contagion of the season, I catch the train on Saturday afternoon for Koroit to see relatives and friends, and revisit boyhood's scenes. Two trains left Spencer-street for the west crowded with passengers bent on a similar mission and holiday-makers leaving the city to recuperate in the country for a few days.

The journey came to an end soon after midnight, and Sunday morning showed the district fresh and green in every direction. The season's greetings tendered by everyone—old schoolmates and neighbours—made

A KOROIT OAT CROP.

one feel that life, after all, was well worth living. To me it was particularly so, and for the next three days driving, picnicking, and goodwill were the order of the day. As a lad, many a pleasant hour was spent on the beach at Armstrong's Bay, and now the same gathering of periwinkles and dozens of other kinds of shellfish, watching fishes of almost all sizes, shapes, and colours—bream, parrot, and zebra-coloured fish, some like little sharks—brought a complete forgetfulness of business cares for the time being. Perhaps few places can be found where the people are more industrious and thrifty or the land more fertile than in the district of Koroit. It is an accepted axiom that the capital value of land is determined by the amount—or rather the value of produce—it can be made to grow yearly, and when it is mentioned that the price of land in this district ranges between £40 and £70 per acre, some idea may be gained of the returns secured from it. In the borough of Koroit, the municipal valuation averages £50 per acre, and a strip of country from Dennington to Rosebrook, about 12 miles long, with a varying width averaging 2½ miles, and comprising about 30 square miles in area, is just as fertile, its continued fertility being chiefly due to splendid management. Each farmer notes closely not only the result of his own efforts, but also carefully observes the methods practised by the leading cultivators in the neighbourhood. Therefore, if a new variety of seed be successful, it is only a matter of a couple of seasons when it has spread throughout the entire district

or, if any new development in tillage or the order of the rotation of crops takes place, or the use of improved implements or stock, the lesson is not lost.

Unless people are up early in the morning and watch every opportunity they cannot profitably hold such high-priced land. In this connexion it may be mentioned that some of the land which 20 years ago was deemed to have been exhausted has now been made by forethought and management to yield crops as good as are obtained from the best of it. By slipshod methods the soil became hungry, and poor crops of barley, hay, even potatoes and grass, were the rule. The potatoes were impoverished and blistery, and the cereals showed yellow and sickly, clumps of more vigorous growth here and there through the paddocks. The pursuit of a comprehensive scheme of rotation of crops, and the adoption of dairying and rational cultivation have brought the fertility of the farms up to a very high point; in fact, instances may be found where the problem of "how to prevent the undue growth of straw in the barley and oaten crops" is being seriously studied, for, when too heavy, the rain and wind spread the crops flat on the ground.

In order to convince readers in other districts of this State or elsewhere, I have obtained permission from certain farmers to mention their names; consequently, the systems of cultivation and their results may be seen by any one. Of course, in doing this, I owe an apology to hundreds of others who grow equally good crops and secure similar returns. I would recommend any one interested in the rotation of crops to pay a visit to the district at any time of the year, but preferably during the months of November or December, for a more suggestive object-lesson, as far as closer settlement and thorough farming are concerned, cannot be seen in any part of the Commonwealth.

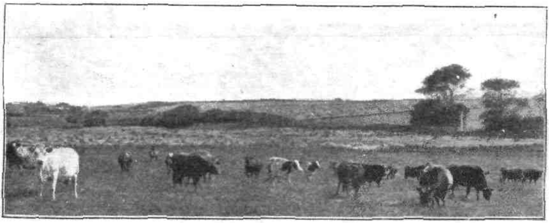
GLENROSE FARM.

Mr. D. Mooney's Glenrose Farm, Illowa, of 155 acres, was the first I visited. Prior to last year it consisted of 112 acres, when 43 acres, costing £57 10s. per acre, or £2,472, were added; whilst about seven years before only 82 acres were occupied. The growth of this farm is specifically referred to, as it is typical of the district that all the most successful farmers began in a small way, and after having thoroughly mastered the management of their little properties added to them as opportunity occurred. In contrast to this method we find that many would-be farmers are ambitious to secure an area of 320 or 640 acres to commence with, and its cultivation, or "lack of cultivation," is responsible for the unprogressive condition of many neighbourhoods.

Glenrose Farm is subdivided into 13 paddocks, 72 acres under grass, and 12 acres of lucerne, making 84 acres chiefly devoted to dairying; and 30 acres of potatoes, 27 acres barley, 14 acres oaten hay, account for the remainder. The pasture consists of English rye-grass and white clover, but, on account of the green and vigorous growth of cow-grass knee-deep on a neighbour's farm, it is believed that an addition of cow-grass to the mixture would be an advantage. This cow-grass was sown with a mixture of rye-grass, but the former had evidently taken complete possession, and at the moment was showing in full bloom. Mr. Mooney states that the legumes are not "so hard on the ground" as rye-grass, as they cover the surface and prevent loss of moisture through evaporation. In ploughing, the rye-grass sod turns over dry, and has a skin requiring more cultivation

to make a good seed bed. When such is secured, it is powdery and hungry in appearance, unlike that after cow-grass and clovers. When turned up after the latter the soil remains more open, free and crumbly, and altogether in better heart and condition; it seems to hold the moisture better, and does not require the same amount of cultivation.

Sometimes a paddock of rye-grass is saved in the spring and cut for hay, and although lucerne does not do as well here as I have seen it in many other parts of the State, it is regarded as a great adjunct to the other pastures. The lucerne was cut twice this season, the second cutting being left on the ground. It is intended to graze it until next spring. The stack of 12 tons saved will be given to the cows before winter comes on. Mr. Mooney is well satisfied with lucerne, and intends sowing down another paddock. He also adds that "every dairy farmer should have lucerne." When grazed in winter it has a tendency to swell the cattle, but this is counteracted with the hay fed. No ill-effects have been noticed in the milk, and doubtless this is accounted for by the care taken in feeding. The cows are not at any time allowed the free run of the lucerne paddocks, being turned in for a couple of hours each day, when an increase in the milk supply always follows. Forty-eight dairy cows, 50 sheep, 8 two-year-old and 10 yearling heifers are kept. The sheep act as scavengers in clearing up the paddocks, and supply mutton. When all the flock are fat, they are sold and replaced with another lot of stores. The heifers are to replace old cows and culls, and a margin is provided, allowing for some not coming up to expectations. Five fat cows are being turned out for the butcher as the result of last year's experience with them in the milking yard. Some three working horses (mares), milk delivery-waggon horse, buggy horse, and pony for boys to run in cows, messages, &c., are kept.



GLENROSE DAIRY COWS.

The cows are all crossbreds (Ayrshire and Dairy Shorthorn), with the Ayrshire blood predominating. Calving occurs mostly in the months of May, June, and July, with other cows coming in at different periods, so that milking is carried on all the year round. At present a Durham bull is kept, and 43 cows are milked, a couple of months' spell being given each member of the herd before calving. Up till June last, only 25 cows were kept, but with the increase in the size of the farm, other cows were bought, and through the pressure of increased work and responsibility, together with the unreliability of outside labour, Mr. Mooney is making arrangements for the installation of milking machines before the opening of another season.

All the milk is delivered to the Southern Cross Creamery, a branch of the Koroit Butter Factory, and the following table shows the total quantity of milk delivered each month, the respective tests, butter contents, prices per lb., and cheques received, including a bonus:—

Month.	Gallons.	Test.	Butter. lbs.	Price.	Cheques.		
January ...	877	4.3	421	8½d.	£14	18	2
February ...	439	4.5	221	9d.	8	5	9
March ...	280	4.5	141	10d.	5	17	6
April ...	168	4.7	89	14d.	5	3	10
May ...	173	4.0	76	10½d.	3	6	6
June ...	926	4.0	411	10½d.	17	19	7
July ...	2,314	4.0	1,027	10d.	42	15	11
August ...	3,075	3.9	1,330	10d.	55	8	4
September ...	3,101	3.8	1,306	9½d.	51	13	10
October ...	3,623	3.8	1,525	10d.	63	10	10
November ...	3,425	4.0	1,519	9½d.	60	2	6
December ...	2,957	4.0	1,312	9½d.	51	18	8
			Bonus	...	3	5	9
	21,358						
Total	...	...	...	...	£385	7	2

Twenty-five cows was the extent of the herd for the first half of the year, and 48 for the latter half. The average return comes out in the neighbourhood of £10 per head; of course, as the larger number were milked for the flush portion of the season, the true average cannot be ascertained.

PIGS.

Some 60 pigs are kept, all reared on the farm from five brood sows. Berkshire sows and a white Yorkshire boar form the breeding stock. Until quite recently, Berkshires were practically the only pigs reared in the district, but continued in-breeding weakened their constitution, and now a first cross of the white Yorkshire, Berkshire, and Tamworths are in general demand, as their progeny are more robust, quicker growing, and better fattening pigs. The bacon curers like them very well. Two litters a year of from 8 to 12 are secured, with an average (after allowing for accidents and deaths) of not less than 8 at a time, or 16 pigs for each sow. When rearing the young, sows are given bran and lime-water in the food to keep up a good flow of milk, and make the young pigs healthy and vigorous. After providing for bran and other food, &c., the pigs bring in considerably over £100 per year.

POULTRY.

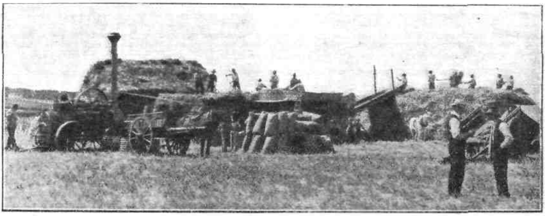
On asking about the poultry, Mr. Mooney at once went in search of Mrs. Mooney, as she has sole charge of that particular department. It was quite a treat to meet such an enthusiast. Although no account was kept of the eggs, I learnt that, in addition to a plentiful supply for the house, at least £1 worth per week is frequently sold, and Mrs. Mooney's average pocket money per week from this source would certainly not be less than 10s. Some 50 head of brown Leghorn fowls are on the place. Of course, nothing is purchased for them, grain seconds and potatoes being the only food prepared. No old fowls are kept, and a simple and ingenious

method is followed to determine the ages of each season's birds. A pig-ring is attached to the right ankle of the first year's chickens; the birds of the second year carry rings on the left ankle, whilst the third year's birds are left without any; then, as the next brood of chickens come in, the old birds with the right anklets are all fattened for the pot. The next year the left anklet poultry are treated likewise, and so on, the flock thus being kept in full profit.

Mrs. Mooney also directs the operations in the vegetable and fruit garden. Water is laid on from a windmill, and the year round all kinds of seasonable vegetables are abundantly provided.

POTATOES.

The 30 acres of potatoes are of the New Zealand "Pink-eye" variety, with the exception of one acre of "Brownell's Beauty." The latter turned out a failure, having missed, although they did fairly well, but not so good as the "Pink Eyes," during the previous year. The yield of the main crop just dug comes out at 6 tons to the acre.



GLENROSE BARLEY AND OATS.

Mr. Mooney grew 27 acres of Battledore barley, reputed to be grub-resisting, but he naively added: "In a bad year the caterpillars do not respect the reputation." He thrashed from the whole area 1,275 bushels, or 47 bushels to the acre; 13 acres of it averaging 55 bushels, the estimate for the whole Koroit district being from 45 to 50 bushels. The crop is said to be light on account of the severe weather experienced, but of course the absence of grubs this season is in the farmer's favour. A few years back, 68 bushels to the acre was the yield on this farm, and the poorest crop grown averaged 45 bushels. Formerly "Chevalier" barley was cultivated, but as it had to be cut too green on account of grubs, a good sample was impossible, and consequently it was abandoned. Barley is invariably grown after the potato crop, and is followed with oaten hay. About the 1st of June, the barley is sown, and the paddock is cleared again for the run of pigs and cows by the first week in January. Last season, the stock had possession before Christmas, and in a favorable year, after the pigs get the run of the paddock for picking up, a green growth of barley comes up providing splendid green stuff for the cows, and helping materially to tide over summer, autumn, and early winter.

Fourteen acres Algerian oats for hay are grown, yielding about 3½ tons to the acre. Hay is spread in the paddock for the cows in the winter, as well as providing chaff for the horses. Last season it was chaffed and

fed to the cows in boxes, in addition to being given whole on the pasture the paddock system affording the better results. The barley straw stack also provide feed and shelter. In addition to the cows doing better out side, the pastures on which hay and straw are spread, benefited and showed much improvement as compared with the areas not touched. Particular emphasis was laid on the paying aspect of feeding hay to cows, Mr Mooney warmly pointing out that "it keeps them strong in the winter, and they come in in better condition and fuller profit."

GLENROSE HAY CROP SAVED FOR COW FEED.

SHELTER.

All the cows were rugged last winter with rugs home-made of two bags with beneficial results. Boxthorn hedges are grown for shelter, and four groups of 5 chains each, as well as blue gums are situated in favorable angles of the paddocks, those where the cows are chiefly kept at night being particularly sheltered with plantations. The blue gums were grown from seed set in boxes, and then planted out.

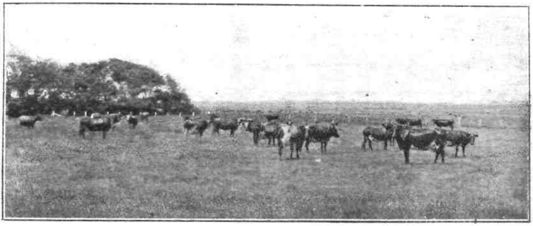
SUMMARY.

None of the crops or yields are exceptional, for the returns from the cows have been eclipsed in the State and elsewhere—both in and beyond the Western District. The estimate for the potato crop is not heavy, neither is there anything remarkable about the farm. The fact that intelligent and thoughtful cultivation has gradually enhanced the value of the property to an extent probably unequalled elsewhere is the most impressive point. Although it would be inquisitorial to supply definite returns, enough has been adduced to convince any one that with such management a loss would be impossible. In making up the results at the end of the year, the question resolves itself into one of relative profit depending on the season and prices. Although the capital sunk in the farm is large, there will be a considerable margin on the right side after interest on outlay, wages, wear and tear, and all expenses are provided for. While in a very bad season it may not amount to more than a couple of hundred pounds, in a good year it may run into over three times that sum.

The crux of the rotation system is its reliability—all the risks and uncertainties of the farmer being reduced to a minimum, yet authorities in the district readily admit that further observation will enable much more to be achieved.

YANGERY PARK FARM.

Across the road from "Glenrose," is the property of Mr. John Lindsay, Yangery Park, Illowa, which consists of 81 acres, with an additional 21 acres adjoining, making 102 acres altogether. He has also some 65 acres of bush land a few miles away where some of the young stock and dry cows are grazed. Sixty-seven acres are under grass, 60 being occupied by cattle, and 7 by horses. There are 13 acres of potatoes, 16 of barley, 3 of oaten hay, 1 of mangels, and 6 of garden, trees for shelter, pig paddocks, &c. A mixture of English rye-grass, cow-grass, and white clover comprises the pasture. There are at present 55 cows on the property, 53 of which are milking, whilst up to 60, or a cow to the acre of grass have been kept on the place. Some 60 head of poultry, including a few ducks and turkeys, complete the live stock equipment, and keep the house going, bringing in about 10s. in cash per week.



YANGERY PARK HERD.—"A COW TO THE ACRE."

SEASONABLE SUGGESTIONS.

A feature in connexion with Mr. Lindsay's management is that he not only feeds all the hay and straw to his stock, but also buys fodder from the neighbours. Last year he purchased 10 tons of oaten straw at 10s. per ton, and 5 tons of bran at £5, making a total of £30 for cow fodder. The straw is chaffed and fed with bran, and sometimes oats. Fifteen pounds' worth of wheat and £10 worth of pollard were purchased for pig feed. Mr. Lindsay is a firm believer in buying feed for cows and pigs, and in this respect he is following the practice of the most scientific countries in the world. Denmark, according to last year's figures which have just reached me, imported maize and oil-cake, &c., as fodder for cows to the value of £9,400,000, and exported to Great Britain £18,390,000 worth of manufactured food, almost wholly dairy products—butter, ham, bacon, pork, lard, &c. This is a lesson that ought not to be lost sight of by Victorian farmers. There is a desire to find a market abroad for hay, chaff, and other kinds of fodder. By all means dispose of produce in the most payable markets, but before going afield, the profitableness of feeding dairy cows as Mr. Lindsay does should be tried. In this case, it has been found economical to feed hay, straw, chaff, and bran to cows, grain and pollard to pigs, and thereby make more money than by selling the fodder outright.

METHOD OF FEEDING.

The cows are fed in the bails, and after milking is completed the feed is placed in a long trough for the following meal. A little salt is added and it is thoroughly mixed with boiling water. Bags are placed over the top, thus steaming the feed for some ten hours, and leaving it nice and warm when measured out. Feeding is commenced in February (mangels are given broadcast after turning out in the evening), and is continued till the end of March, by which time the rainy season usually begins, and has furnished a plentiful growth in the stubble and pastures. The object in feeding at this period of the year is to prevent the cows from running down in supply and condition, so that when the green grass is available they at once improve and come on in their flow of milk. If not fed thus early the milk supply dwindles almost to vanishing point. Many of the cows go out and the rest of the season is lost, whilst even of those which do not actually go dry it is rare to find that many come up again when the fodder is again available. The cows calve all the year round, but the chief number in July and August, just before the beginning of spring.

GENERAL FEATURES.

Clumps of hedges and trees provide shelter in winter, and in this respect Yangery Park is well provided, there being any amount of timber grown by a former owner of the property, and now wisely conserved; consequently it is not considered necessary to rug. The farm is divided into some eleven paddocks, and the rotation is typical of the system throughout the district, viz., potatoes, oats, barley, and four years' grass. It will be noted, however, that the barley is sown after the oat crop. Only two calves were reared this year, whilst last season twelve was the number. Thirty pigs including five Berkshire brood sows, are kept. One hundred fat pigs were sold during the last twelve months at over £2 per head. There is an average litter of about eight to each sow, with two litters for each season.

The following is a list of Mr. Lindsay's milk cheques for the last twelve months, with full particulars:—

Month.		Gallons.	Test.	Butter. Lbs.	Price.	Cheques. £	s	d.
January	...	2,484	4.2	1,164	8½d.	4	13	9
February	...	1,480	4.4	729	9d.	27	6	9
March	...	1,317	4.6	687	10d.	28	7	6
April	...	793	4.5	400	14d.	23	6	8
May	...	1,244	4.3	599	10½d.	26	4	1
June	...	1,709	4.2	800	10½d.	35	0	0
July	...	1,946	4.1	887	10d.	36	19	2
August	...	2,449	3.9	1,059	10d.	44	0	6
September	...	2,924	3.9	1,264	9½d.	62	0	7
October	...	3,861	3.6	1,534	10d.	63	18	4
November	...	3,886	4.9	1,725	9½d.	68	5	7
December	...	3,600	4.2	1,687	9½d.	66	15	6
		27,693		Bonus	...	7	19	11
Total	...	...	...	...	...	£531	8	4

POTATOES.

Mr. Lindsay finds the New Zealand Pink Eye the best cropper by a couple of tons to the acre. The old red (*i.e.*, Brown's River) has not yielded well during late years. The unfavorable winds are deemed to be to some extent responsible. The stalks of the red potato are smaller, and get greatly tossed about, growth being thus retarded, whilst, as the New Zealand Pink Eyes spread closer to the ground, the leaves only are affected by the high winds. The unsaleable small potatoes are fed to cows and pigs.

FLOWERFIELD PIGS.

FLOWERFIELD FARM.

About a mile north from the Koroit Post-office is situated Mr. J. Martin's Flowerfield Farm, of 316 acres—241 are under grass, 39 potatoes, 22 oats, and 14 wheat. Twenty acres of the grass are reserved for meadow hay. Thirty cows are kept, and have brought in monthly cheques as follow:—

Milk (Gallons.)		Cheques. £ s. d.	Milk (Gallons.)		Cheques. £ s. d.
1,640	...	27 3 3	1,336	...	22 16 9
1,293	...	23 5 9	2,733	...	37 12 6
1,198	...	25 15 10	2,971	...	50 11 9
815	...	24 11 2			
806	...	18 12 9	17,201		57 17 5
600	...	13 11 3	Bonus	...	7 7 5
695	...	13 10 10			
908	...	16 16 8			£339 13 4

Mr. Martin's method of rotation is similar to those already described, but as a portion of the farm is on the edge of the good country and unsuitable for cultivation, it is devoted to grazing alone. A number of very fine Shropshire sheep are kept. Some 200 sheep an . 110 lambs were fattened and sold to the butchers last year. £50 worth of wool was also disposed of, and the "Flowerfield" rams and ewes are regular prize winners at all the district shows.

CLOVERDALE FARM.

Adjoining Mr. Lindsay's property is Mr. W. Stacey's "Cloverdale" Farm, of 105 acres, 40 acres of which are under pasture, 30 potatoes, 20

barley, 11 oaten hay, 2 mangels, and 1½ maize, 1 acre being leased to a neighbour. The 30 cows kept yielded £280 for the year. Seventy pigs brought in £150, and deducting £20 for food, &c., £130 net. Different varieties of potatoes are grown, embracing 11 acres of "New Zealand Pink Eyes," 13 acres of "Brown's River," 5 acres of "Snowflake," and 2 acres of "Brownell's Beauty," but Mr. Stacey has made up his mind to drop the last-mentioned in future, as they have not come up to expectations. Threshing was just completed, and one paddock of Battledore barley yielded 63 bushels to the acre, the average for the whole crop coming out at 56 bushels.

FLOWERFIELD HERD. MILKING TIME.

In the barley-stubble is appearing burr, white and Japanese clovers. Mr. Stacey intends to feed pigs on the barley if it does not realize 5s. per bushel, and he is satisfied from past experience that it will pay him to do so. It may be mentioned that 14 head of young stock, 6 horses, and the pigs are grazed on the farm.

GENERAL COMMENTS.

For the many now beginning to farm under the Closer Settlement scheme, it will be opportune to give further particulars of cultivation and of the seed sown per acre, &c., &c. The chief purpose of this rather rambling narrative is to indicate the methods practised by farmers in a locality famed for its high-priced land. So far, it will be seen that the profitable cultivation of the soil, the system of rotation, and the feeding of hay, grain, and straw to the stock are the points most commended. In addition to these, however, it should be mentioned that the implements, machinery, and horse-power have been studied closely with a view to increased efficiency and greater economy in working.

I can recollect as a lad when the Clydesdale horses were in general use. The heavy work in connexion with farming, viz., the carting of produce by road to Warrnambool or Port Fairy, favoured this breed. Carting operations began in January and continued daily right through to the end of April—the commencement of the ploughing season. Sellar's single-furrow ploughs were used for putting in potatoes, each row requiring three sods of 9½ inches. An acre per day was considered good, and it required a smart team long hours and constant work to sow 1¼ acre in a day. Very heavy double-furrow ploughs were also the rule, and so with all farm appliances and operations—they were heavy, slow, and cumbersome.

Now the Clydesdales are being supplanted by the Suffolk Punch, and a cross of these breeds, the animals being powerful as well as more active and possessing greater stamina.

In sowing potatoes, a plough of half the weight of the old-fashioned implement, of much lighter draught and turning a 14-inch sod, is used, so the two furrows cover each row of potatoes instead of three as before.

POTATO DIGGING AT MR. W. CROWE'S.

POTATO MEMORANDA.

Potato land is usually ploughed twice, and the early seed planted to a depth of 4½ inches. The crops are generally dug before the stalks have withered, or any hot weather experienced to injure the tubers. With the later crop, however, an extra inch in depth, or 5½ inches, is made for the seed in order that a good covering against the hot February sun may be secured. Rows are sown 28 inches wide, and sets planted from 18 to 20 inches apart.

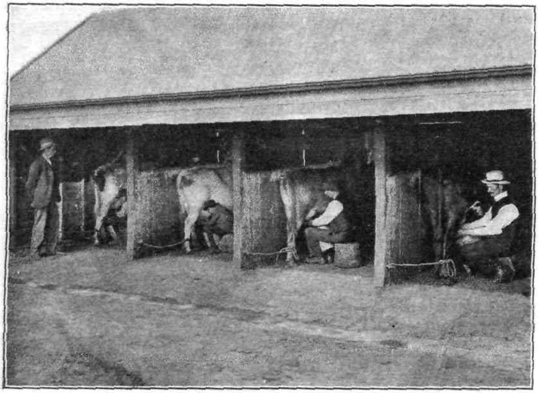
The crop is usually drill-harrowed three times; on each occasion the implement is fitted with different tines. When the plants appear above the ground a drill-harrow is used, then hand-hoed between. The second drill-harrowing, as well as repeating the former operation, puts a little earth up to the stalks, and the last harrowing is done as the rows are about to close. With hoeing, weeding, and hilling-up, cultivation operations are completed, and a clean, healthy and attractive-looking crop is the result. Probably not more than a few solitary stalks of "fat hen" (*Chenopodium album*), or docks, show to the acre when digging time arrives. Sometimes, however, rain falls after hilling-up and before the ground is covered with the stalks, when a luxuriant crop of "fat hen" is the result. In heavy ground a two-horse scarifier is used to burst up the soil, instead of the drill-harrow for the second cultivation, the practice being varied according to the condition of the land and its requirements.

HEAVY CEREAL GROWTHS.

As further evidence of the weight of cereal crops grown, it may be mentioned that the twine taken to bind an 11-acre paddock of oats was 19½ balls of 4½ lbs. weight each, or a total of 88 lbs. at 7½d., which comes to exactly 5s. per acre. A 25-acre crop of barley required 48 balls, or a sum of 5s. 3·5d. per acre for twine. Both these crops were grown where for 50 years the land has been cropping and grazing alternately without artificial manure.

KOROIT SEED FORMULAE.

Potatoes.—From one-third to half a ton per acre, depending on sample.
Barley.—55 lbs., or one and one-tenth of a bushel to the acre.
Oats.—80 lbs., or 2 bushels to the acre.
Pasture—A mixture of 15 lbs. English grass, ½ lb. white clover, and ½ lb. cow-grass per acre.



MILKING TIME AT GLENROSE FARM.

PROPORTION OF CROPS TO PASTURE.

The following details secured of five separate farms show the proporion of the different crops grown in the district to pasture :—

Total Acres.	Grass.	Potatoes.	Barley.	Oats.	Hay.	Mangels, Maize, &c.
280	164	46	25	33	12	...
155	84	30	27	...	14	...
106	67	13	16	...	3	7
105	40	30	20	...	12	4½
100	40	22	17	20	...	...
746	395	141	105	53	41	11½

It will be seen that on an average 51 acres out of every hundred are ıder grass, 20 acres under potatoes, 14 sown with barley, 7 with oats, 6 ith hay, and 2 of mangels, maize, &c.

BURNLEY SCHOOL OF HORTICULTURE.

FIRST PRIZE ESSAY, DECEMBER, 1905.

Subject: "The Most Common Causes of Irregular Bearing and Imperfect Development of Tree Fruits and their Remedies."

In the world of to-day a progressive evolution is taking place, where only the most capable are allowed to stand, and the slow and uninitiated are left behind. As with other things, the science of fruit-growing is rapidly forging ahead, and only the best and the most payable methods are in use. The time has been when many, failing utterly to comprehend that any knowledge was required, attempted to grow fruit without understanding anything about fruit trees, or about soils, or climate, or disease. The result was utter failure, and so the idea spread that fruit-growing was not a paying concern. Fortunately there were others, who had knowledge, and so were able to get good returns from their orchards. But to-day knowledge is more thorough and more prevalent. Fruit-growing has become a science worthy of being thoroughly studied, and people have begun to realize that it is no use trying to grow fruit without an adequate knowledge. Following on added knowledge came added economy, and so trees that do not give back a proper return for their size and age, must either be thrown out or treated so that this defect may be remedied as far as possible. This brings us to the subject of this essay, "The Most Common Causes of Irregular Bearing, &c."

Healthy Trees Fruit Regularly.

When a tree reaches the fruiting stage it ought to bear, and go on bearing systematically, till the weakness of old age is reached, when its paying life is done. But if the tree instead bears sometimes heavy crops, and sometimes none at all, or if it only fruits well on one side and grows very inferior fruit on the other, this is just the kind of tree that we cannot afford to give room to in a well-planned orchard. Some time ago the only thing to be done was to pull it up and throw it on the rubbish heap, and plant a new one, for often the cause of this irregular fruiting was unknown. But now the most common causes are known, and it only remains to apply the right remedies. We can now list the most important of these causes, and point out the remedies for each case.

Systematic Pruning a Necessity.

The most common cause of all is want of pruning, or want of sufficient and correct pruning. It is not at all uncommon to meet people who tell you that their fruit tree bears very heavy crops, and they boast perhaps that they took so many cases of fruit from it that year. When you ask them about the next year, they tell you that they do not expect much fruit then, but the year after that again there will be another good crop. That may do for the amateur, but it will not do for the professional fruit-grower, who must have a regular supply of fruit each year. The effect on the tree will be most hurtful. It will tend to curtail the life of the tree, and cause such exhaustion that it has to "lie fallow" for a season, because it has not the strength to put forth new healthy wood to bear flowers and fruit for the following year. These heavy crops, too, are very apt to break the branches and throw the tree out of form. Proper pruning will prevent this by allowing the tree to bear just sufficient for its strength, so that when next year comes the tree will not

have become so exhausted as to be unable to bear at all, or, at the most, only inferior fruit. The whole object of pruning is to insure more regular crops over a longer period, besides obtaining an increase in size of the fruit, combined with a better appearance and quality.

Types of Bearing Wood.

Each kind of fruit tree has its own type of bearing wood; thus the apple and pear on fruiting shoots and spurs, the cherry chiefly on spurs, the apricot and plum on shoots and artificial spurs, and the peach on one-year-old shoots and spurs. If the different types of bearing wood are not known, the pruner may cut away the very pieces of wood most suitable to fruiting, and no crop, or very little, will be the result. Especially may mistakes in pruning be made in trees that have peculiar habits of bearing. In the Jonathan apple the flower bud is borne at the end of the shoot or spur; the Irish peach, too, puts out long shoots on which the flower buds will be at the end. It will thus be easily seen that if the pruner cuts away half the shoot or spur, as would be correct in most trees to strengthen it, he will also cut away the fruit. If these shoots are left long the first year, and then bear fruit, the weight of it will bend the shoot and cause spurs to form naturally where the constriction of sap is. These spurs will then bear the fruit for next season, and the shoot can then be shortened. Williams' Bon Chrètien pear has the same manner of bearing, and so is treated in the same way. The Winter Nelis pear has always been considered hard to get to fruit, because its habit of bearing was not known. Only one kind of wood bears fruit in this case, and that is a small spur.

Other fruit trees are what is called "shy-bearing." By that is meant that the tree takes a longer time to mature its wood and bear fruit than other trees. It may bear a little fruit now and then, but will not bear full crops regularly. The Nickajack apple is one of these shy-bearing trees. A seedling fruit tree that has not been "worked," that is, neither grafted nor budded, is also irregular in coming into bearing. It is irregular, too, in the kind of fruit it bears, the latter not always coming true. Ten years will, in some cases, elapse before any fruit is borne, because the tree is too strong. The seedling is the strongest tree. "Working" is always a weakening factor, the sap not having so straight a flow.

Varying Degrees of Vigour affect Fruit Bearing.

Want of design or balance in the tree at the start is a frequent fault, and one that must place the tree at a disadvantage. Where one side becomes the strongest, it will continue to be the strongest at the expense of the weaker side, unless some means are adopted to restore the balance. In a young tree with its three main branches starting from the three uppermost buds, the top branch will always be found to be the strongest, the second the next strongest, and the lowest the weakest, because sap flows first and strongest to the highest point. This may be checked by leaving the weakest branch the longest, and the strongest the shortest. If this balancing has been neglected, or has not been sufficient, it may be done later still when the leaves are out. If the strongest be just topped, it will give the weakest time to make up to it.

Trees can often be seen with two or three strong branches on one side, and four or five weak ones to balance the other side. The weak tree will bear most on the shady side, for that will be the stronger side; while

the strong tree will bear its fruit on the sunny and exposed side, that having the weaker and riper wood. The fruiting wood should be evenly distributed throughout the whole tree, for equal size and vigour mean equal growth and fruiting. A well-designed tree will have a healthier life, will fruit more regularly, and live longer than one lacking balance. When a tree is getting old, its fruit will naturally become poorer; but if it be cut back and reduced in size, it will have less to do, and the fruit will be better and more sure.

When a Tree should Bear.

The ages and conditions under which trees bear have great influence on their regular bearing capacities. The maturity of the tree, not so much its age, decides the time of its bearing. In a very suitable position the tree might be allowed to bear in three years; whereas the same kind of tree, in an unfavourable position, might not be mature for ten years. Pears under favourable conditions may be fruited on an average of three years, and remain regular in bearing. In poor soils they would need five years. Apples, plums, and cherries can be dealt with in the same way. With peaches, a strong tree must be secured before allowing it to fruit; perhaps three years would be long enough in the hot north, where it is at home; but in the south and colder districts, not before it is five years old. The age is the same for apricots. Lemons differ, for wherever they grow freely they may be allowed to fruit.

The Need of Light.

"Blindness" is frequently the result of bad pruning, or insufficient thinning out. The sap runs to the highest and strongest point first, so that the heaviest shoots are found naturally at the top of the tree. These, if they are not taken away, form a kind of hood, preventing air and light entering the centre, to the detriment of the inside branches. It is quite common to find unripe wood inside, and consequent fruitlessness or blindness. Each branch should have sufficient room to throw out its fruiting shoots and spurs without cramping the next. The main branches should be at least 2 feet apart, if there are fruiting shoots. Where there are only fruiting spurs they could be closer. If the shoots at the top of the branches are not removed, the consequence will be that all the sap sent up by the roots will remain there, and the lower part of the tree, being unnourished, will become quite bare, and will be so much space wasted. By thinning out of too crowded wood, and by keeping the top of the tree light, the growth will be forced down below and the whole tree furnished with fruiting wood. "Blindness" may also be caused by the tree being either too strong or too weak. A strong tree may easily be made stronger by a wrong way of pruning. The bigger the wound the stronger will be the new growth. No heavy cutting back should be done on a strong tree, but the whole piece taken away. The fruiting wood will have to be some "removes" away from the trunk to get weak enough wood, as fruit is borne on a slow flow of ripened sap, and cannot be borne where the flow is strong. The branches should be encouraged to grow in a horizontal position, for sap flows strongest along the most upright channels. In a strong tree the sap is often so unripe that only leaf buds are formed, or such flower buds as are formed are pushed off. A weak tree will need a heavy pruning to strengthen it. Everything should be done in the way of cultivation, good drainage, &c., and the branches should be grown on as upright lines as possible.

Root Systems.

Trees, by wrong methods being adopted may be very much weakened, and, strange as it seems, it is perhaps then that a heavier crop of fruit will be borne. But this is only a temporary spurt of the tree, as it will be followed by irregular and light crops, and final death, if the tree be not in some way strengthened. A mistake when the young tree is first planted may cause irregular bearing. Very few realize the importance of pruning a young tree's roots. Often the young tree has strong roots on one side, and weak ones on the other. If the strong roots are not curtailed, the tree will be thrown out of balance, for it is an axiom in fruit tree culture that the side which has the strongest roots will also have the strongest branches, and these would throw the whole framework of the tree out of balance. Another way to balance the roots would be to plant the side of the tree with the stronger roots to the windy quarter; the opposition of the wind and the exposure would be a weakening influence. The cutting back of roots in the dormant season would weaken the whole tree, because it would mean that the reserve of food to be laid up by the roots would be lessened; also the cutting back of head and roots in the growing season will inevitably weaken. If the soil in the summer is allowed to get hard and impervious to rain, or is cultivated deeply, the whole tree is affected adversely. Any ploughing in summer should be very light, just enough to form an earth mulch and to allow rain into the soil. Cold, wet, heat, and drought, when excessive, will chill, sour, dry, and harden the roots, and so injure the tree. Where coarse weeds are turned in round the roots of the tree in winter, and cold and wet come, the result will be dangerous, as they would serve as a host for the water and sour the ground; if left on the surface they would prevent the sun from warming the soil. In summer both of these things may be done, and would be advantageous. The effects of heat and drought may be made less hurtful if proper treatment be given to the soil. The heat may be prevented drying up the roots by a mulch of light litter being put round the tree, or a soil mulch given. The severity of drought may be lessened by the soil round the tree being "dished," so that when rain comes every drop of water will be caught by the tree, and the soil mulch will also be of value.

The Importance of Sound Leaves.

Leaves have a great influence on the flower-buds, and, according to ıeir size and vigour, will be the quality of the bud. They serve as the ͤeders of the buds, pumping up sap from the roots and elaborating it. ɔ wherever any damage has been done to the leaves, the flower-buds, ıd consequently the fruit, suffer. If a severe frost has come when the aves are on the tree, and nipped them, the fruit may be spoilt for that ason. Hot winds, severe storms, and hail may also damage the tree, d cause destruction to the season's crop. An injury to the bark also cessarily weakens that part of the tree which is affected. The wounded rt should be cleaned, the ragged pieces cut away, and clay put over : wound to prevent air entering, so that the damage sustained may be ıaired.

The nature of the seasons has marked effects upon trees. The weak ͤ in a favorable season might be strong enough to bear, but if a severe ught comes, it is too weak to bear. A strong tree in a good season ıld be too strong to bear, but a bad season might have just the kening effect the tree required, and so a good crop would be the result.

Good Drainage aids Bearing.

The uneven bearing of a tree is sometimes caused through bad drainage. On one side of the tree the water may lie at its roots, and on the other there may be insufficiency of water. The first position may suit a water-loving plant like the quince or the fig, but the dryness of the other side will perhaps kill that part of the tree, or curl and shrivel up its fruit. Orchard land must be drained. Clayey soils need draining more than sandy, for the latter are often naturally drained. Draining will prevent surplus water lying about in winter, and will conserve water for summer use. The more uneven the depth and the surface of the soil is, the worse will be the natural drainage; and the worse the drainage is, the more uneven will the fruit-bearing be. So any cost incurred by draining will be amply repaid by full crops.

What Cultivation Secures.

Improper cultivation plays its part, too, in the irregularity of fruit cropping. The three principal foods that trees need are nitrogen, potash, and phosphoric acid; and lime may be added to these. These all have their functions to perform that the tree may be nourished and bear fruit. The nitrogen gives the deep green to the leaves and strong young growth, the phosphoric acid is required for the ripening of the wood, while the potash is necessary in the fruiting stage for the ripening of the fruit. Lime is a quickener of all three and other plant-food salts, and so is always an adjunct to a soil. Trees for a while may grow and bear well on what there is already in the soil, but there must come a time when, if nothing be given back to the orchard to replace that used up, nothing will also be returned from the trees. The trees can tell us themselves what they are needing. If they are making rapid growth, and have deep green foliage, and mature their wood well, it shows they are well supplied with food. But if they grow slowly the second or third year after planting, and their foliage turns yellow, it shows they have need of food or moisture, or both. If trees make too rapid a growth on reaching bearing age, and show little inclination to fruit, it means they are getting too much nitrogen, so the planting and turning in of leguminous crops, which have the power of collecting and storing up nitrogen, must be discontinued. Potash must be restored continuously to the soil, as the tree removes more of this component than of the others. It can be given as a manure in the form of kainit. Phosphoric acid can be given as bone-dust, guano, and superphosphates, and nitrogen by the turning in of leguminous crops, such as vetches, peas, beans, lupins, clovers, &c. The whole of the orchard cannot be treated with manure salts; that would be too costly a business, but individual areas might be treated. Cultivation also means the loosening and pulverizing of the soil, which is done in orchards by the plough, the disc, and the harrow. The two chief seasons for this work are autumn and spring; it is also done at other times, according to the need and the weather. If cultivation be neglected the trees will suffer to a considerable degree. Cultivation means the mixing and reblending of the soil grains, the exposure of fresh surfaces, and the opening of the top soil to allow air and water in. It can therefore be understood that cultivation is very necessary to the well-being of trees.

The Tree's Inner Nature.

We have dealt so far with the tree as a whole, and the conditions affecting its health as a whole, but now we can approach the tree closer

and examine its buds and flowers, and see if any cause can be found for irregular bearing. The first cause will be found in the dropping of buds. Buds may form all over the tree, and a good crop is expected. A great many of these drop off, leaving only a miserable crop to mature and ripen. When this dropping occurs on long shoots, the reason very likely is that there is not sufficient sap to support them all. The pruning is at fault, and this can be remedied by reducing the shoot and making it strong enough to bear what buds are left. Another reason for bud dropping may be that the flow of sap is too strong in a shoot near by where a heavy cut has been made by the pruner. Do not prune the strong shoot hard, or it will grow stronger, but thin out and expose it, so that it may ripen well and bear. An improper ripening season of the previous autumn will cause bud dropping; this may have been caused by a very mild summer or imperfect drainage about the tree, or the tree may have been too crowded. A great many flowers always fall, especially with apples and pears, a fortnight after the trees have come into flower, but this is Nature's own pruning or thinning, and one to be desired. An early frost often plays havoc with buds, nipping them off when they are swelling to form flower buds. In stone fruits the flower buds are more subject to harm from cold than leaf buds. The weather of the season before the expansion of the flower buds exerts a potent influence upon the number of flowers formed; the weather also during the expansion of the flowers and the setting of the fruits increases or reduces the coming crop.

The imperfect setting of the fruit is another cause of irregular crops. This is greatly influenced by the prevailing weather, so that one year the crop might be much heavier than that of another year. If a severe late frost comes when the fruit is just formed, it will be responsible for the dropping of the young fruit; and if cold, hail, and rain are prevalent about this time, the fruit will get knocked down or damaged. Bad weather, especially cloudy weather, if it lasts for some time, is very injurious to the fertilizing of the flowers. Fruit trees are almost altogether insect fertilized (to a small extent, perhaps, they are wind fertilized), and in bad weather bees will not be out working. So the longer cloudy weather lasts the fewer will be the flowers fertilized, and consequently the less the fruit borne. Very windy weather blows the pollen away, and causes flowers to be infertile. A great many of the tree fruits are infertile to their own pollen. For this reason an orchard planted solely with Bon Chrètien pears will be found to be unfruitful, simply because of the infertility of their own pollen, *i.e.*, their flowers will not set unless their stigmas receive pollen from some other variety. So it is necessary that at least three or four different varieties should be planted in every orchard. It is wise to plant together those varieties that flower about the same time.

Destructive Agents.

Another cause of imperfect setting is the presence of disease in the tree. Disease is always weakening to a tree, and it is those trees that are the weakest that disease most rapidly attacks. So to avoid disease the tree must be kept healthy. Especially are leaf-eating insects to be kept away from trees. The leaves are the feeders of the flower buds, and if they are eaten away and destroyed, the buds will also perish. The peach aphis is very serious for this reason. It prevents both flower and leaf buds from opening well, and distorts the young shoots. When severe it will cause the leaves to fall at a time—October—when the tree has need

of all its leaves. Where it is present the trees should be sprayed with Bordeaux mixture (6 lbs. bluestone, 4 lbs. lime to 50 gallons of water) in winter, or with tobacco water (1 lb. each of tobacco and soft soap to 20 gallons of water) when it appears in the spring. Fumigation, when the tree is in leaf, with cyanide of potassium is good, but is expensive. To strengthen the tree so that it may throw off the disease, mulch the ground with tobacco refuse or manure salts, especially kainit or rock salt.

The pear slug damages the leaves of the pear, cherry, and plum, eating away the tissues and leaving only skeleton leaves, and so ruins the fruit. As the slug has a slimy coat, ashes, or fine earth, or lime thrown on to it will cause it to curl up and fall to the ground, where it will die. A spray of Paris green (1 lb. Paris green, 5 lbs. lime to 300 gallons of water) can be used where the pest is bad. For the larva in the soil, a solution of bluestone or sulphate of iron might be put into the ground.

Some of the fungous diseases, too, are dangerous to the buds. Peach leaf curl is one of the worst. It attacks the leaves as they unfold, blistering them and preventing them fulfilling their proper function of starting the buds in the spring. To remedy this disease, spray with Bordeaux mixture in winter after the pruning. In spring, as the leaf buds are bursting, spray again with one-third the strength. Never allow old prunings or infected leaves to lie about to spread the disease. Some varieties suffer more than others, so do not plant them. Briggs' Red May, Crawford, and Salway are, in most soils, good resistant varieties.

Black spot of the apple and pear causes cracking and distortion of the fruit if it comes early, and scurvy patches if later; very often the fruit falls off. Spray for this disease with Bordeaux mixture in spring, when the flower buds open. Some varieties of apples, Cleopatra, Ribston, and Fillbasket, are very susceptible to it, and should not therefore be grown where the disease is bad.

Powdery mildew of the apple distorts the leaves, and so also affects the buds. To prevent it spreading, burn all prunings and spray with Bordeaux mixture in early spring, and in winter stronger.

The pear phytoptus or mite damages the leaves by blistering them, and thereby causes the tree to shed its leaves prematurely, to the detriment of the fruit. Spray with kerosene emulsion (½ lb. hard soap, 1 gallon of water, 12 gallons of kerosene) or soft soap and sulphur (1 lb. to 5 gallons of water) in summer.

Oidium or powdery mildew of the vine prevents the leaves unfolding properly. Dust with ground sulphur in the early morning while the leaves are moist.

Black spot or anthracnose of the grape attacks the fruit itself, causing a malformation in the fruit. Vines should be stripped of the loose bark and painted with Bordeaux paint (Bordeaux mixture, with clay and lime mixed with it).

It can be seen from all these facts that a great deal depends on the start in life a young tree gets, whether it is at home in its surroundings, and also whether it is built up properly and receives proper treatment all its life. These points decide the difference between a regular and an irregular tree, a paying and a non-paying one.

—E. M. ROLLAND.

SURVEYING ON THE FARM.

A. S. Kenyon, C.E.

Mensuration.

Both the horizontal and vertical method of taking measurements, so far as applicable to the ordinary wants of the farmer, have now been gone into. Some of those given have their direct application, while others are of indirect use only. Their use involves what is known as Mensuration; that is, the finding of areas and volumes or quantities. The area of any figure or surface is the space contained between its length and breadth without any regard to its thickness. In the case of rectangular figures, that is with four right angles, the length and breadth are easily obtained.

Fig. 23.

In triangles, the area is the base or breadth multiplied by half the perpendicular height, that is, the line drawn from the opposite angle at right angles to the base. If the triangle has one angle a right angle, the area then is half the result of the multiplication of the two sides forming the right angle. The area of a parallelogram, a four-sided figure with its opposite sides parallel, is the base multiplied by the perpendicular height, or, to put it another way, one side multiplied by its right angled distance from the other side—see Fig. 23. The area of a trapezoid, a four-sided figure with two sides only parallel, is the two parallel sides added together and multiplied by one-half their distance apart measured at right angles.

MEASUREMENT OF AREAS.

The definitions and rules just given may seem rather confusing; but their practical application is simple. Any paddock, no matter how irre-

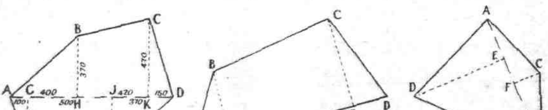


Fig. 24.

gular, so long as its sides are straight, may be divided into trapezoids and triangles, the triangles being generally right-angled. In such an instance as given in Fig. 24, a line is chained from the angle at A to the opposite angle at D. Along the line perpendiculars are laid out and measured, to

all the remaining angles, B, C, E, F. Then it will be seen that the area of the whole paddock is cut up into four triangles and two trapezoids. Their areas are—Triangle ABH equals the length from A to H multiplied by one-half the distance from H to B; the trapezoid HBCK is given by the length BH added to CK and multiplied by one-half of the distance from H to K, which is the perpendicular distance between the two parallel sides, BH, CK; the triangle KCD similarly equals KD multiplied by one-half KC. In like manner the areas of the two triangles and the trapezoid below the line AD may be found. The addition of all these areas will give the total area sought for

Taking the measurements given in the figure, the areas are—

Triangle ABH, 400 multiplied by one-half of 370 equals ...	74,000
Trapezoid HBCK, 370 added to 470, multiplied by one-half of 420 equals	176,400
Triangle KCD, 150 multiplied by one-half of 470 equals ...	35,250
Triangle AGF, 100 multiplied by one-half of 250 equals ...	12,500
Trapezoid GFEJ, 250 added to 330, multiplied by one-half 500 equals	145,000
Triangle JDE, 370 multiplied by one-half of 330 equals ...	61,050
Total	504,200

The measurements are in links and the area sought is consequently 5.04 acres, or 5 acres 0 roods 7 perches.

In four-sided paddocks, which are not parallelograms or trapezoids, perpendiculars may be set up from one side only, two triangles and a trapezoid resulting, though in general, the measurement across the diagonal giving two triangles only is preferable—Fig. 24. The areas of the two triangles may be found by setting up perpendiculars as just explained. Should, however, the perpendiculars be difficult to measure, the following rule may be employed to find the areas of the triangles. In this case, measurements of the sides are required as well as the length of the diagonal. To find the area of a triangle when the lengths of all three sides are known, add the whole three lengths together and divide the sum by two. Call this result the half-sum; subtract from the half-sum each side in turn. Then multiply together the half-sum and each of the three remainders. The square root of the result will be the area of the triangle. Expressed in symbols, calling the sides a, b, and c, and the half-sum, that is, $a + b + c$ divided by two, S, the rule is—

$$\text{Area of triangle} = \sqrt{S \times (S-a) \times (S-b) \times (S-c)}.$$

This method involves measurement of the sides of the figure, and consequently is on the whole rather more cumbersome than the perpendicular method. All the examples given suppose it possible to get free access to any part of the inside of the paddock, but if only the o[illegible] side is readily accessible, the method is still simple. Chain along one side; continue chaining, if necessary, until opposite perpendicularly the outermost angle. Extend the perpendicular through that angle, measuring offsets to the intervening angles, and chain along until another perpendicular can be set up to the next outermost angle. Chaining along thus, setting up perpendiculars to each angle the result will be a rectangle, of which the area is, of course, readily found, enclosing the area sought for. The triangles

and trapezoids outside the paddock, but inside the rectangle, are now to be calculated and their total subtracted from the area of the rectangle The result will be the area of the paddock. Fig. 25 will show plainly the method.

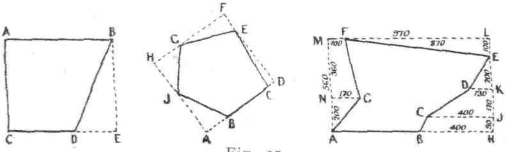


Fig. 25.

Using the measurements given in the figure, the area of the rectangle is 490 multiplied by 280, equals 543,200. From this has to be subtracted the outside triangles and trapezoids—

Trapezoid BHJC, 440 added to 400, multiplied by one-half of 90, equals	37,800
Trapezoid CJKD, 400 added to 130, multiplied by one-half of 170 equals	45,050
Triangle DKE, 200, multiplied by one-half of 130, equals ...	13,000
Triangle ELF, 100, multiplied by one-half of 870, equals ...	43,500
Trapezoid FMNG, 100 added to 170, multiplied by one-half of 360, equals	48,600
Triangle ANG, 200 multiplied by one-half of 170, equals ...	17,000
Total	204,950

Deducting this from 543,200, the area of the rectangle, we have 338,250, or 3.38 acres, as the area of the irregular paddock.

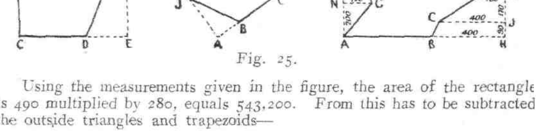


Fig. 26.

All the examples given are of paddocks with straight sides. Very often a boundary is not straight, being a creek or a railway curve or some other irregular line. Cut off the curved or irregular boundary by a straight line ranged across the paddock—see Fig. 26. The irregular portion may be cut off by more than one line if the circumstances make that course preferable. The result, however, of cutting off the irregular portion is to give a paddock with straight sides, the area of which can be obtained by the methods already given, and a portion, generally a narrow strip with one or more straight sides and an irregular boundary. The area of this may be found by measuring offsets, or the distances of the irregular line from the straight one, and applying to them a rule known as Simpson's. Divide the straight line after measurement into an even number

of equal distances. At each of the points thus obtained, including the two ends of the line, measure the distance to the irregular boundary; the distances should be measured at right angles to the straight line, found generally with sufficient accuracy by sighting. These measurements are called offsets. As the number of spaces was even, and measurements were taken at both ends as well as in between, the offsets must be an odd number. Now add the first and last offsets—those at the ends of the line—add all the odd-numbered ones and multiply the sum by two, add all the even-numbered ones and multiply them by four. Add all the results together, multiply them by the equal distance apart of the offsets and divide by three. In Fig. 26 the first and last offsets are each nothing, as the irregular line passes through the ends of the straight line; the third, fifth, seventh, ninth, and eleventh, the odd-numbered ones, add up to 1,540; this multiplied by two, gives 3,080; the even numbers, second, fourth, &c., yield 1,600 and multiplied by four 6,400. The sum of all these, 0, 3,080 and 6,400, is 9,480; multiplied by the distance apart, namely, 100, we get 948,000, and this, divided by three, gives 316.000 square links or 3.16 acres, the area of the piece in question. The distance apart of the offsets will depend upon the conditions and the amount of accuracy required. If the boundary be fairly regular or a curve, they may be as much as several chains apart. All areas found by the methods given will be in square feet if the original measurements are in feet or square links, if originally in links. Square feet may be turned into acres by dividing by 43,560, the number of square feet in an acre. Square links may be reduced by cutting off the last five figures, 10 square chains or 100,000 square links forming one acre.

MENSURATION MEMORANDA.

Cases will occur where measurements of areas of circles or similar curves are required. It will be convenient to group here for reference the properties of some of the more important figures and bodies.

The circumference of a circle, *i.e.*, the measurement around it, is the diameter multiplied by 3 and 1-7th, or the radius multiplied by 6 and 2-7ths.

The area of a circle is—the square of the diameter multiplied by .785, or, more roughly, 4-5.
- the diameter multiplied by the circumference and divided by 4.
- one-half the diameter multiplied by one-half the circumference.
- the circumference squared and divided by 12.6, or multiplied by .08 or 7-88ths.
- the radius squared and multiplied by 3 1-7th.

The area of an ellipse is the bigger diameter multiplied by the smaller diameter and multiplied again by .785 or 4-5ths.

The area of the surface of a sphere is the diameter squared and multiplied by 3 and 1-7th; that is, it is four times the area of a circle of the same diameter.

The volume of a sphere is the diameter cubed; that is, multiplied by itself twice running, and multiplied by .5236.

The area of the surface of a cylinder is the circumference, found as above, multiplied by the height; if necessary, add the areas of the circles forming the ends.

The volume of a cylinder is the area of the circle forming the base multiplied by the height.

The area of the surface of a cone is the circumference multiplied by the slant height divided by two, with the area of the base added, if required.

The volume of a cone and of a pyramid—that is, a body formed by three or more triangles meeting at a point and by a straight-sided figure forming the base—is the area of the base multiplied by the height and divided by three.

The volume of a frustrum of a cone or pyramid is the areas of the two ends added to the square root of their product, multiplied by the height and divided by three.

The volume of a wedge—that is, a body formed by five flat surfaces; two, the sides, being trapezoids, two, the ends, triangles, and one four-sided figure for the base—is the length of the edge added to twice the length of the base and then multiplied by the width of the base and by the height, and the result divided by six.

The Prismoidal Formula.

Excepting the sphere, all the solids referred to are cases of the *prismoid*. The prismoid may be described as a solid body having for its ends two parallel plane or flat faces and all other boundaries straight, that is, a straight edge placed on a boundary, should coincide with it from end to end. The great majority of solids, the contents of which may be required, are prismoids; exceptions are barrels, spheres, &c., all having bulging sides. The volume of a prismoid is found by adding the two end areas to four times the middle area, multiplying by the distance apart of the ends and dividing the result by six. The middle area referred to is the area of the body at a point equally distant from the two ends, and is not the mean of the two end areas. As a general rule, one practically applicable to all cases likely to occur in farm practice—four times the middle area is the same as the multiplication of the two end lengths by the two end breadths. Thus the rule becomes the multiplication of the end lengths by the end breadths, and of the addition of the two end lengths by the addition of the two end breadths, all added together; multiplied by the distance apart of the ends, and divided by six.

Stacks.

The practical application of these rules and formulæ will now be given. In the first instance, hay or straw stacks will be dealt with. One of the most common methods for calculating rectangular stacks—the one used by most insurance companies—is: Ascertain the length and breadth about half-way between the ground and the eaves, and find the height from the ground to the eaves and from the eaves to the ridge. The contents are found by multiplying the length by the breadth and by the mean height. The mean height is generally taken as the height from the ground to the eaves with one-third of the height from the eaves to the ridge added. Sometimes one-half the eaves to ridge height is allowed. The one-third method is never right, nor does it or the one-half method approach the truth, unless the walls are vertical and the ends of the top vertical and not sloping—an unusual form of stack. The error is always in favour

of the buyer; never of the seller. Using the prismoidal formula, the measurements required for a rectangular stack are the length and breadth at the ground and at the eaves; the height to the eaves, and from there to the ridge; and the length of the ridge. There are but few more measurements, and the results obtained are exactly correct. Take the following instance:—A stack of 50 feet by 10 feet at the ground, and 60 feet by 20 feet at the eaves, and 50 in length along the ridge. The length and breadth one half-way up are consequently 55 feet and 15 feet respectively. The height to the eaves is 10 feet and from there to the ridge 6 feet. The contents by the one-third method will be:—

> 55 multiplied by 15 equals 825. 825 multiplied by 10 feet, the eaves height with one-third of 6 feet, from eaves to ridge, added, that is by 12 feet, equals 9,900 cubic feet.

By the one-half method, it is:

> 825, as before, multiplied by 10 and 3, one-half the eaves to ridge height, that is by 13, equals 10,725 cubic feet.

By the prismoidal method, the stack is divided into two portions or prismoids, one part above the eaves, the top, and the other, the bottom, below the eaves. Following the rule given, the contents are:—

> The top—breadth at ridge, 0 feet by length at ridge, 50 feet equals 0; breadth at eaves, 20 feet by length at eaves 60 feet, equals 1,200; sum of breadths at ridge and eaves 20 by sum of lengths at ridge and eaves, 110 equals 2,200.
>
> The addition of these is 3,400; multiplied by the height, 6 feet, we get 20,400, and this divided by six gives 3,400 cubic feet, which are the contents of the top.
>
> The bottom—breadth at eaves 20 feet by length at eaves 60 feet equals 1,200; breadth at ground 10 feet by length at ground 50 feet, equals 500; sum of breadths at eaves and ground 30 by sum of length at eaves and ground, 110 feet equals 3,300. The addition of these is 5,000; multiplied by the height 10 50 feet, 50,000; and divided by six, 8,333 cubic feet, the bottom contents.

Adding the top and bottom together, we have 11,733 cubic feet as the correct volume of the stack, as compared with 10,725 and 9,900 given by the approximate methods, nearly 9 and 16 per cent. below the truth (Fig. 27). If the stack have rounded ends, it may readily be converted into an equivalent rectangular stack by deducting one-fifth of the length of the rounded ends, and leaving the width unaltered. For instance, a stack is 30 feet long, with rounded ends starting to curve 5 feet from the ends. The length for the purposes of measurement would be the 20 feet of straight length with 4 feet (instead of 5 to allow for the curve) added at each end, or 28 feet in all. Width and ridge length would remain as measured. Circular stacks are generally small. An approximate rule is to multiply half the circumference, measured half-way between ground and eaves by half the diameter at the same point and multiply by one-third the height from the eaves to the peak added to the height of the eaves from the ground. If more convenient, any other of the methods given for finding the area of a circle may be used in place of the half circumference and half diameter one just given. The more exact way is, as before, to calculate in two parts top and bottom. The contents of the top are the circumference at the eaves multiplied by itself, multiplied

again by 7-88ths, and the result by one-third of the height from the eaves to the peak. The bottom is: the circumference at the eaves multiplied by itself, the circumference at the ground multiplied by itself, and the sum of the two circumferences, multiplied by itself; the whole three results added and multiplied by 7-88ths and by one-sixth of the height from the ground to the eaves. Add the top and bottom results together to get the total contents of the stack.

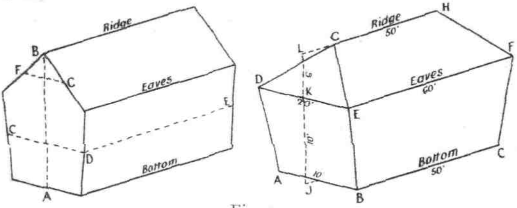


Fig. 27.

WEIGHT OF HAY, &c.

The results obtained by these methods are in cubic feet. The number of cubic feet to the ton is very variable, depending chiefly upon the size of stack, the time stacked, and the class. The best method, though a little troublesome, is to cut out a truss about half-way up the stack—the pressure there being about the average. Measure the contents of the cut in the stack, not the truss itself, and weigh the truss. This will give the weight of a cubic foot, and the total weight of the stack can then be set down with fair accuracy. The following table will be useful:—

If 1 cubic foot of hay weighs 8 lbs., 1 ton measures 280 cubic feet.
If 1 cubic foot of hay weighs 7 lbs., 1 ton measures 320 cubic feet.
If 1 cubic foot of hay weighs 6 lbs., 1 ton measures 373 cubic feet.
If 1 cubic foot of hay weighs 5 lbs., 1 ton measures 448 cubic feet.
If 1 cubic foot of hay weighs 4 lbs., 1 ton measures 560 cubic feet.
If 1 cubic foot of hay weighs 3 lbs., 1 ton measures 747 cubic feet.

If the truss method is not used, the following table will enable a fair guess to be made:—

Number of Cubic Feet to 1 Ton of Hay.

	Oaten hay.		Wheaten hay.	
	Sheaved.	Loose.	Sheaved.	Loose.
New, just stacked	350	400	400	500
New, fortnight stacked ...	325	370	375	450
New, one month in stack ...	300	350	350	400
Old, last season's stack, from ...	300	325	320	400
,, ,, ,, to ...	250	320	270	370

In some cases, coarse stalky hay will weigh even less than the worst figures given in the table. Allowance must be made for the thatch, if any, on the top, and for the inferior quality of stuff generally found near the ridge.

TANKS, &c.

Tanks, embankments, or excavation may be readily calculated by the prismoidal formula or the modification of it given. For tanks, where the water contents are wanted, or where the ground is fairly level at the top surface, multiply the length and breadth at the top—ground or water level as required—the length and breadth at the bottom, and the lengths at the top and bottom added together by the sum of the breadths. Add the three results and multiply by the depth and divide by six. In Fig. 28, with the dimensions given, the quantities are—

Top breadth, 60 feet by top length 100 feet, equals	6,000
Bottom breadth 20 feet by bottom length 60 feet, equals ...	1,200
Top and bottom breadths, 80 feet by top and bottom lengths 160 feet, equals	12,800
Total	20,000

Multiply by the depth, 10 feet, result 200,000, and divide by 6, giving 33,333, the number of cubic feet in the tank. To obtain the number of cubic yards, divide the cubic feet by 27, or to obtain gallons, multiply the cubic feet by $6\frac{1}{4}$. The same method will apply to a heap of broken metal or a bank, if the surface of ground at the bottom is level. If the surface be irregular, whether for a tank or an embankment, several vertical and parallel cross-sections, cutting the object into small portions, are required.

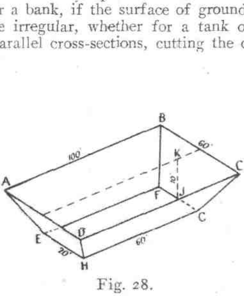


Fig. 28.

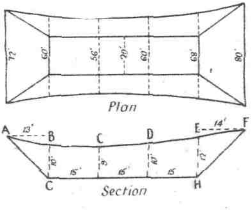


Fig. 29.

In Fig. 29 is shown a tank with surface very irregular; cross sections are taken as shown, and the excavation calculated in sections. The width at the commencement is 72 feet, and the depth, of course, nothing; the width at the first cross section is 60 feet at the surface and 20 feet at the bottom, an average width of 40 feet and the depth 10 feet. The contents of this first portion are—

Width 72 feet by depth 0, equals	0
Average width 40 feet by depth 10 feet, equals	400
Sum of widths 112 feet by sum of depths 10 feet, equals ...	1,120
Total	1,520

Multiplied by the distance apart of the cross-sections 13 feet, and divided by 6, we have 3,293.

The next portion, the second, is—

Average width 40 feet, by depth 10 feet, equals	400
Average width 38 feet, by depth 9 feet, equals	342
Sum of widths 78 feet, by sum of depths 19 feet, equals ...	1,482
Total	2,224

Multiplied by 15 feet, and divided by 6, equals 5,560.

The third portion is—

Average width 38 feet, by depth 9 feet, equals	342
Average width 40 feet, by depth 10 feet, equals	400
Sum of widths 78 feet, by sum of depths 19 feet, equals ...	1,482
Total	2,224

Multiplied by 15 feet, and divided by 6, equals 5,560.

The fourth portion is—

Average width 40 feet, by depth 10 feet, equals	400
Average width 44 feet, by depth 12 feet, equals	528
Sum of widths 84 feet, by sum of depths 22 feet, equals ...	1,848
Total	2,776

Multiplied by 15 feet and divided by 6, equals 6,940.

The fifth, and last portion is—

Average width 44 feet, by depth 12 feet, equals	528
Width 80 feet, by depth 0, equals	0
Sum of widths 124 feet, by sum of depths 12 feet, equals ...	1,488
Total	2,016

Multiplied by 14 and divided by 6 equals 4,704.

The total for the whole excavation is therefore 26,057 cubic feet, or 965 cubic yards.

Similarly any long excavation such as a channel, or banking such as a road formation, may be taken out by the modified prismoidal formula, with the certainty that the results are correct and not merely approximate with an unknown amount of error.

TIMBER, LOGS, &c.

For round logs, multiply length by the quarter-girth, multiplied by itself. This will give approximately the sawn timber result. To get the actual contents of the log, multiply length by the average girth multiplied by itself, and divided by 12.6, or multiplied by 7-88ths. A ton of firewood varies from 40 cubic feet, the selling rate, to 50 or 52 feet, buying rate. On the Murray River, the ton is 4 feet by 4 feet measured on the face of the stack, irrespective of the length of the wood. Thus 5-feet wood gives 80 cubic feet, and 2-feet wood 32 cubic feet to the ton. A cord of firewood is a stack 8 feet by 4 feet by 4 feet, or 128 cubic feet.

MISCELLANEOUS QUANTITIES.

A rod of brickwork is $30\frac{1}{4}$ square yards, that is $272\frac{1}{4}$ square feet, one brick and a half thick. Find the area of the surface in square feet; divide by $272\frac{1}{4}$; multiply by the number of half-bricks in the thickness of the wall, and divide by 3. Brickwork is now generally taken out in cubic yards. Metals frequently come into quantity calculations. One square foot 1 inch thick,

of wrought iron weighs	40.4 lbs.
of cast iron weighs	37.5 lbs.
of steel weighs	40.8 lbs.
of zinc weighs	37.5 lbs.
of brass weighs	43.7 lbs.
of copper weighs	46.2 lbs.
of lead weighs	59.3 lbs.
of gold weighs	100.0 lbs.

An equivalent volume of water weighs only 5.2 lbs. Five cubic feet of cast iron weight one ton. Rough and ready approximations for carting, or for widths of tires, are as follow :—

Hardwood, sawn, 800 feet super,	6 in. x 1 in.	— 1 ton	
Sleepers	30	cubic feet	— 1 ton
Props	30	cubic feet	— 1 ton
Rails	40	cubic feet	— 1 ton
Posts	30	cubic feet	— 1 ton
Piles, in the round ...	35	cubic feet	— 1 ton
Piles, squared	30	cubic feet	— 1 ton
Stone, rough	14	cubic feet	— 1 ton
Stone, dressed	13	cubic feet	— 1 ton
Spalls	$25\frac{1}{2}$	cubic feet	— 1 ton
Road metal and screenings	23	cubic feet	— 1 ton
Pitchers	19	cubic feet	— 1 ton
Gravel	22	cubic feet	— 1 ton
Sand	25	cubic feet	— 1 ton
Lime	10	bushel bags	— 1 ton
Wool, pressed, greasy ...	6	bales	— 1 ton
Wool, pressed, washed ...	8	bales	— 1 ton
Hay, pressed	135	cubic feet	— 1 ton
Potatoes, 12 4-bushel or	15	gunny bags	— 1 ton
Bran and pollard ...	108	bushels	— 1 ton
Barley	11	bags	— 1 ton
Chaff	25	bags	— 1 ton
Flour	11	4-bush. bags	— 1 ton
Maize, whole	10	bags	— 1 ton
Maize, crushed ...	11	bags	— 1 ton
Oats	13	bags	— 1 ton
Wheat	9	bags	— 1 ton
Peas	9	bags	— 1 ton
Bricks	1000		— 3 tons

Steel Fencing Wire—

No. 6 gauge, 361 yards to 1-cwt. coil, 4 cwt. 3 qrs. 14 lbs. to 1 mile
No. 7 gauge, 428 yards to 1-cwt. coil, 4 cwt. 0 qrs. 13 lbs. to 1 mile

No. 8 gauge, 509 yards to 1-cwt. coil, 3 cwt. 1 qr. 23 lbs. to 1 mile
No. 9 gauge, 609 yards to 1-cwt. coil, 2 cwt. 3 qrs. 15 lbs. to 1 mile
No. 10 gauge, 747 yards to 1-cwt. coil, 2 cwt. 1 qr. 12 lbs. to 1 mile

Barbed wire—

No. 12 gauge, 490 yards to 1-cwt. coil, barbs $3\frac{1}{2}$ in. apart.
No. 14 gauge, 770 yards to 1-cwt. coil, barbs $3\frac{1}{2}$ in. apart.

Any reader finding difficulties in either field work or calculations should write to the Editor of the *Journal.* Full explanations or further information as required will be furnished by letter or by publication in the *Journal* if of sufficient general interest.

THE LAMB TRADE.

(Continued from page 121.)

A. A. Brown, M.B., B.S.

CONSERVATION OF SUITABLE BREEDING EWES.

An important matter in connexion with the building up of our flocks is the conservation of suitable breeding ewes, and it behoves every grazier to judiciously retain every year the numbers requisite for his purposes. If indiscreet disposal of ewe lambs suitable for breeding occurs, then there is no hope of the State acquiring vast flocks, and consequently the export trade must ultimately be contracted in extent.

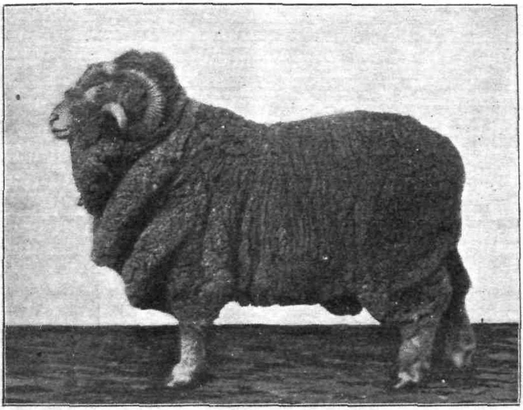
The lamb trade in New Zealand no doubt rapidly developed into a prodigious one, but its further expansion has, for a time at all events, received a decided check, in consequence of the shortage of breeding ewes in that country. There graziers are now keenly feeling the results of their indiscretion in not retaining sufficient breeding ewes to keep a prosperous trade on a constant level.

The judicious retention of sufficient breeding ewes is an important point to every progressive grazier. Where a national industry is at stake it appeals somewhat to all, so that legislation on the subject may be required to stop indiscriminate slaughtering of ewes. Every season one sees large numbers of ewe lambs at the slaughter-houses, and that in spite of the fact of the great difficulties that are found in securing ewes for breeding purposes. Graziers should jealously retain all suitable ewes capable of throwing lambs at least for another three years, until the country is amply stocked.

When tempting prices are offered to growers by the export buyers, it is perhaps only natural that they would be desirous of availing themselves of the opportunities of getting ready cash for their stock, hoping, of course, of being able to restock their estates from the flocks of breeders in distant districts, which the buyers do not frequent. Distant breeders, from various causes, may themselves, unfortunately, have parted with too many ewes, and, consequently, the frozen meat trade receives a decided set back from a general shortage prevailing.

BEST BREEDS OF SHEEP FOR MEAT EXPORT PURPOSES.

The question of the breed to employ to obtain the carcass that the meat exporter wants is a most important one, and it demands the exercise of considerable judgment. When wool raising was the staple industry, the Merino held sway, but now that the meat export trade has sprung into virile existence, early maturing breeds, better adapted to graze over the artificial pastures of smaller holdings, w ll find favour. Since the Merino breed has a great hold in Australia, graziers perforce must largely use the



MERINO RAM.

Good type for building up flocks intended to produce lambs for export.

ewes of this strain, and ewes derived from the Lincoln-Merino cross are perhaps the best under the circumstances to employ. There are districts where the Merino thrives to advantage, and in such districts good export lambs could be obtained from the crossbred Merino ewe. Climate plays a very important part in connexion with the question of breeds to employ, and the Merino undoubtedly suits the Mallee and the Wimmera. Perhaps the best breed to meet in all its aspects, the requirements of the meat export trade, is the cross between a pure bred Shropshire ram and a Lincoln-Merino crossbred ewe. The Lincoln ram, mated with a Merino ewe, produces a neat, compact, hardy, well-wooled sheep. This cross is less liable to lung or stomach worms than the pure Lincoln, or to foot-rot than the Merino. The Shropshire ram is then mated with a Lincoln-Merino ewe, and an ideal lamb for the London market is the product of the union. The selection of the ewe to breed from is an important matter. No ewes should be used for breeding unless they are of proper shape.

The ewes employed for breeding purposes should be deep, level, square, and roomy. The rams, in order to get the best results, should have roomy breasts and prominent briskets, and should be thick over the shoulders, back, and loins, and the head, which should be small, set upon a thick neck. Grade rams should be avoided, for the appearance of the carcasses derived from their employment undergoes such modifications that their value for export purposes is much depreciated.

STUD LINCOLN LAMBS.
The property of J. S. Mortimer, Esq., Katunga.

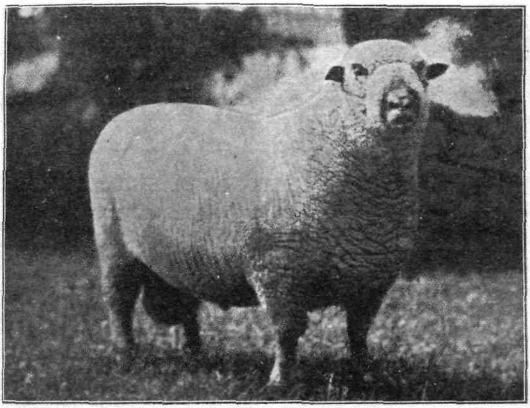
The Shropshire breed for meat export purposes is increasing year by year, but so far none of the pure breed have been exported, but have been reserved for stud purposes. Moreover, they are too expensive to export as meat. Crosses of the breed are exported, and something like 25 per cent. of all lambs now exported are Shropshire crosses, which indeed are the most suitable lambs for export. When killed and dressed, their carcasses are plump and fleshy, with thick legs and shoulders. The carcass is well-invested with fat, which, however, is not laid on in a thick layer, but is distributed thinly over it, giving it a nice bright appearance. They are large-framed, fairly hardy, and exceedingly prolific sheep, fattening rapidly, and maturing early.

The Lincoln-Merinos are, as a rule, big carcassed sheep, and the ewes make excellent mothers, and the effect of crossing them with the Shropshire is to get a more evenly rounded and plump carcass. The Shropshire cross has the advantage that it tends to make all members of the flock present an even appearance. It however introduces a disturbing element in the wool industry that demands consideration. If a slump occurred in the meat export trade, a number of lambs would be left behind which, when adult, might prove unprofitable as wool producers, the wool being coarse and of a lower market value than the Merino or Lincoln breeds. Although Shropshires are producers of wool of a low market value, they are ready fatteners, and would be marketable in the following year as mutton for either export or local trade requirements. Whatever damage is likely to happen to the wool industry lies in graziers retaining crossbred Shropshire ewes for breeding puposes; but, in this connexion, it must be considered that the results obtained by breeding lambs for meat export will greatly outweigh in value any loss that may be sustained on the wool returns.

For breeding export lambs, some graziers favour ewes that are a cross between Merino rams and Lincoln ewes, whilst others favour the cross between the Lincoln ram and Merino ewe. Merino ewes, Leicester ewes, crossbred Leicester-Merino ewes, Comeback ewes, and Lincoln ewes, all

have their advocates as being suitable animals meeting all varying conditions to employ with a pure bred Shropshire ram.

It is, however, generally admitted that the cross between a pure Shropshire ram and Lincoln-Merino ewe is the best lamb to produce for lamb export purposes, and this cross will always command high prices, if prime.



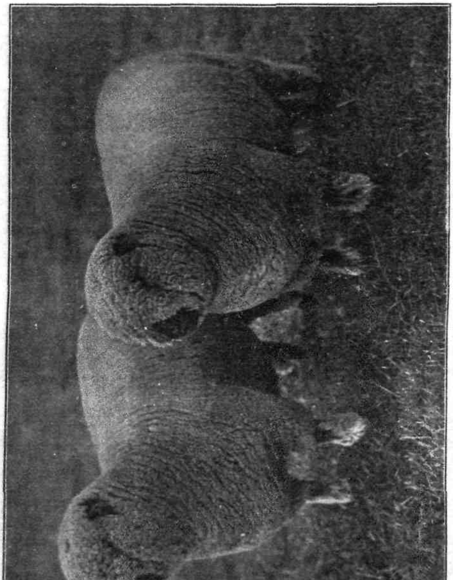
"ROSARIAN," CHAMPION SHROPSHIRE RAM.
The Property of R. C. Kermode, Esq., Mona Vale, Tasmania.

As far as the wool industry is concerned, so long as Shropshire ewes are not bred from, the quantity of Southdown wool offering would not be in sufficient amount to damage the wool market. With the breaking up of large estates in Victoria, wool production will, in a few years, give way to meat production, and the best breeds to meet such requirements must be gone in for. Farmers and graziers are more and more going in for raising fat lambs for export, and are induced to do so by the excellent prices that exporters have been offering for lambs fit for export, and they should be careful to grow what the exporter requires. Of lambs now exported something like 25 per cent. are Shropshire crosses, 65 per cent. are crossbreds (chiefly Lincoln- and Leicester-Merino), and 10 per cent. are Merinos.

FREEZING WORKS IN THE STATE AND FREEZING ACCOMMODATION AFLOAT.

There are at present seven freezing works in the Metropolitan area, and three freezing works in the country, where meat is frozen for export. If shipments were made every week, something like 5,000,000 lamb carcasses could, with present equipment, be frozen yearly, provided the trade was carried on all the year round, and the works devoted exclusively to it.

The ships installed with refrigerating machinery that come to Victorian shores have a large carrying capacity, and, if a regular weekly service could be insured on all sides, then the freezing chambers ashore would not get congested. So long, then, as accidents do not happen to the regular departure of the ships engaged in the trade, there is, at present, sufficient space afloat to meet Victorian requirements. Should, however, a hitch occur to the departure of a vessel, as from some accident happening to its



YEARLING SHROPSHIRE EWES,

Bred by Geo. Simonds, Esq., Tasmania. [This and the two preceding illustrations are from photos. lent by Messrs. J. M. Peck and Sons.]

machinery, thereby causing delay in the removal of frozen produce from the chambers on shore, then a congestion of these chambers may take place that may occasion considerable inconvenience and an arrest of slaughtering operations, till the congestion is removed. It is when accidents arise that attention is drawn to the fact that the State could make use of more freezing space afloat, but, barring accidents, there is a fair regularity in

the transport of produce by the shipping companies, that meets with the approval of exporters of frozen produce. Tramp ships, installed with refrigerating appliances, call here for cargoes, but their arrival and departure is irregular and uncertain; nevertheless, these auxiliaries aid materially in transporting our produce to the world's centre. As time progresses, and the trade expands, more vessels, no doubt, will come into the regular trade; so no fear need be apprehended of difficulties arising in the way of efficient and quick transport.

Smaller Holdings.

There is steadily progressing in the State the breaking up of large estates, and this progressive tendency will lead to the establishment of industrious graziers who will control smaller areas, and who, in order to be successful, will require to bestow more care and management on their animals than did the large landed proprietor, who trusted entirely to the seasons. The pastoral industry in Victoria is now in a transition stage, and pastoralists are beginning to recognise that old methods must give way to new and improved ones. By the breaking up of large estates, and combining a system of agriculture with grazing pursuits, the productiveness of the land will be vastly increased. By laying down good pastures, the carrying capacity of the land will be increased, and there will consequently be a wider distribution of the wealth derived from the land. The average yield of wool in the grease when sheep receive proper attention will, no doubt, be increased, and a general average of ten pounds ought to be aimed at by all graziers. As showing what can be done on small holdings, the Secretary for Agriculture, New Zealand, in a report furnished in reply to inquiries on the subject, tells us what can be done in that country. He says:—

"In the Hawke's Bay district during the last year a farm of 180 acres, 22 of which were in rape, carried 700 ewes, and fattened both them, their lambs, and an additional 900 lambs, totalling in all 2,300 lambs and sheep that were frozen for export. An average crop of rape has carried 20 lambs to the acre for two months, and, after a spell, carried eight for a further two months. In this instance the seed was drilled in with about 1½ cwt. of bone-dust and superphosphate mixed. The Italian ryegrass has been found productive of excellent results, especially when rain has fallen in the months of February and March. Two and a half bushels should be sown to the acre, and the soil worked fine and well rolled. Such a pasture lasts two years, cutting a heavy crop of hay when sown in the autumn, and carrying with spells 12 sheep to the acre. Land sown broadcast in spring, with Italian rye and rape, and given 2 cwt. of dry blood manure, has been known to fatten 40 lambs to the acre, provided they were in good forward condition.

"Cape Barley and Oats.—Cape barley must have good autumn rains, failing which the crop is not usually remunerative. It comes more quickly, and is more fattening for young sheep than oats, but a crop of Algerian oats stands more feeding later in the season, and with a good rainfall and some short spells, carries from six to twelve lambs to the acre during the autumn and winter.

"A crop of Yellow Globe mangolds in this district, the winter before last, kept 100 sheep per acre for four months.

"A crop of lucerne carried quite fifteen sheep to the acre during the summer months.

"A crop of 20 acres of pumpkins of mixed sorts, sown without manure, and carted on to grass paddocks, carried 2,500 sheep from 1st May to 20th June. These sheep did remarkably well, and had the weather been less inclement, a large number would have come off fat.

"In the Poverty Bay district the flats simply in grass without fodder will carry about five sheep to the acre all the year round, with the addition of Cape barley, or green oats, double that number, with rape somewhat more, and with turnips fifteen to twenty. With a fairly good crop of pumpkins, from fifteen to twenty may be carried, provided the ground can be kept from getting too foul.

"The hill country in grass carried about two sheep per acre, but with assistance in winter with cultivation and fodder, that number could be doubled.

"In the Canterbury district it has been found that turnips will feed from 250 to 300 sheep per acre for a week, and that one acre will fatten about 30 sheep in ten weeks. Rape will carry from ten to twelve sheep per acre. Kale from fifteen to twenty, and Italian rye from twelve to fifteen."

If results such as narrated are possible in New Zealand, what could Victorian graziers achieve with their bountiful soils and salubrious climate?

DISEASES OF LAMBS.

Lung-worms and Stomach-worms.—Numbers of lambs are annually lost from lung-worms (Strongylus Rufescens and S. Filaria), and stomach-worms (S. Contortus), and, of those lambs that become infested and recover, most make but little progress for many months afterwards. The treatment for lung-worm is detailed in the *Agricultural Journal*, of July, 1903, and that for stomach-worm in *Agricultural Journal*, of June, 1905, in articles published by me on Animal Parasites.

Tape-worms.—In *Agricultural Journal*, of July, 1902, appears an article from my pen on tape-worms in sheep, and their treatment. Lambs generally contract the worms soon after being weaned, and the worms persist in their intestines until the animals are about two years old, when they begin to spontaneously forsake their hosts.

As preventives of worm infestation (lung-worm, stomach-worm, tape-worm) lambs should be weaned on turnips, rape, kale, or lucerne, since these foods tend to strengthen the system, and thus enable the lambs to resist invasion by parasites.

Intestinal Derangements.—Intestinal derangements caused by irritant herbage picked up on the pastures, intestinal parasites, &c., are a source of fatalities to lambs. Two to three ounces of linseed oil should be given to clear out ordinary irritant matters from the intestinal tract, and the lambs transferred to good pastures. The treatment for parasitic invasion should be perused in the Journals indicated, and the remedies recommended adopted.

Tetanus or Locked Jaw.—Tetanus is a condition due to a specific germ. To prevent tetanus after lamb marking or castration, Stockholm tar should be applied to the injured parts.

Navel Ill.—Navel Ill is occasionally seen in lambs, but it is by no means of frequent occurrence. It is a septic condition that supervenes on the umbilical wound, where such wounds are left to take care of themselves. In the case of valuable animals, the wounds in the newly-born should be dressed with Friar's Balsam to prevent infection occurring.

Sheep Blow-fly (Calliphora Villosa).—To prevent the blow-fly from striking the ewes and even the lambs, all parts of the animal liable to be soiled by natural discharges of the body, should be shorn of wool, and then dressed with fish oil containing traces of iodoform.

DAMAGE TO LAMBS FROM GRASS-SEEDS.

Besides having to contend with droughts, diseases, and the depredations of rabbits, graziers have yet another formidable enemy, *grass-seeds*, to reckon with. Lambs running on lands where the grasses are long, and the seeds spearlike, often sustain considerable injury through the seeds penetrating their skins. Grass-seeds are a terrible scourge to graziers. At seat of entrance of seeds there is inflammation, ending, perhaps, in pus formation. When the pelt is removed many seeds may be found sticking in the subcutaneous tissues, and it may be that the inflammation has extended deeply into those structures. The carcasses often present an appearance as if the animals had suffered from an eruptive disease. The damage done to lambs by grass-seeds is tremendous, and, so long as sheep are depastured on wide tracts of country, there is not likely to be any means of preventing the damage. In consequence of the inflammation caused by the seeds being in some cases so extensive, such carcasses are condemned.

As time progresses, and pastoral lands become more valuable, and when huge tracts of country are split up into smaller areas, and when water is better conserved, and its supply more certain, and when grasses and other forage crops are grown to feed sheep, then perhaps the grass-seed trouble may be relegated to the regions of oblivion.

RABBITS FOR EXPORT.

During 1905 over ten million rabbits were landed in London, worth £268,000, in addition nearly twelve million skins, worth another £50,000, were exported, bringing the total value of the trade to considerably over £300,000.

Freight to London varies from time to time from 1s. 6d. per crate up to 2s. (last season it touched as low as one shilling).

The charge for freezing comes to 1s. 9d. per crate of twelve pairs.

Railway freight depends on distances; the average cost is about 1d. per pair.

Export rabbits are put up in two grades; the first grade in black branded crates; the second grade in red branded crates.

First grade rabbits are divided into three classes, "Large," 2½ lbs. and over; "Young" 2 lbs. and over; and "Small" 1½ lbs. and over. Corresponding weights are packed in the red crates, but are designated as "Size 1," "Size 2," "Size 3."

At certain times of the season one or other of the two lower weights of the second grade are dropped and packed as skinners.

In the case of furred rabbits, twelve pairs are packed in each crate. In the case of skinners, 30 or 36 are packed in a crate.

The consolidated charge of 1s. 9d. per crate covers the cost of package, grading, packing, handling, freezing, 21 days' storage and shipping.

R.C.

STRAWBERRY CULTURE.

James Lang, Harcourt.

In making a new plantation of strawberries virgin land should be selected if possible, or, failing that, land that has been down in pasture for a few years is the next best. It has been the experience of most strawberry growers that land which has been in cultivation for a few years does not produce good crops of fruit. A rich loamy soil is one of the best for strawberries, although some varieties thrive well on a stiffer soil, and good crops have been obtained from very sandy soils, in the granite soils of Harcourt good crops of fruit have been grown.

In preparing the land for planting, it should be ploughed in the spring-time to a depth of 9 or 10 inches, and allowed to lie fallow till the summer. If weeds should appear, give a good scarifying with the disc scarifier, and then level all down with the ordinary harrow. About the beginning of March a second ploughing should be given, and the land gathered into lands 24 feet wide if the soil is dry, and lands half that distance if the soil is at all damp; give a good harrowing, and the ground is then fit for planting as soon as rain comes.

The earlier the plants can be got in the better for a good spring crop. They should be planted in rows, 3 feet apart, and about 1 foot in the rows from plant to plant. This gives plenty of room for cultivating with the horse hoe. In small plantations where the work is done by hand, 2 feet apart in the rows would be sufficient. After the plants have been put out, it is necessary that they should be kept clean from weeds. On this depends a good deal of the success of the plants the first year, and will involve a good deal of labour in hoeing and weeding; weeds take a good deal of killing in the winter time. Keep the beds all clean and free from weeds in the spring time when the plants are in bloom. It will then be necessary to mulch the plants with straw to keep the fruit clean. Some growers mulch with long stable manure, but this is objectionable. Others use spent tan from the tanneries, but it is apt to promote fungoid growths, which are detrimental to the plants. On the whole, clean straw or dry grass is much the best material to mulch with. During the summer keep the hoe going occasionally to keep the weeds down.

In the second year, about the end of April or beginning of May, the plantation should be lightly ploughed by running a furrow alongside the plants, turning the furrow towards the centre, and then down the opposite side. This leaves a ridge down the centre of the rows and keeps the plants dry during the winter. In the early spring the rows should be ploughed again turning the furrow back towards the plants on either side; this leaves the ground fairly level again. Before ploughing, it would be advisable to give some orchard manure, about 6 cwt. to the acre. This manure contains all the ingredients of a complete manure, and is, therefore, much better for fruit than bonedust or superphosphate alone. Keep the horse-hoe going to keep the weeds down, and when the plants are in bloom, mulch again with straw as in the previous year. It is advisable to make new plantations every three years, as when plants get older than m. they are generally attacked by the larvæ of a beetle which eats out the u. selves. vn. They are then best rooted out.

should be

IRRIGATION.

Where water is available for irrigation, the fruiting season can be greatly prolonged. In laying out the beds with a view to irrigating the plants, it is necessary that the rows should have a fall one way, so that the water runs freely down the rows. Where plantations are made on the sides of steep hills, the rows should be run diagonally across the fall of the hill, allowing a fair fall for the water to run. Where this is done the water soaks in as it runs along the furrow, whereas if the plantations are planted straight up and down the hill, the water will run rapidly off, doing very little good. A shallow furrow should be made with the plough down every second row. The water should be brought along the top of the bed as nearly level as possible. The furrows that run down the rows should be joined into the channel that carries the water; at the junction of the two you will have to put in a weir to regulate the supply of water to each furrow. The weir is made as follows:—Get a small wisp of dry grass, and put it across the top of the furrow, mix some of the soil with the grass, and press down in the middle till the water runs over the top just sufficient to reach the bottom of the furrow. These off-takes are very simple, and, if properly put in, will last for the whole season; the writer has used them for many years. You can always regulate the supply of water into the furrow by pressing the weir down, and raise it a little if you have too much water, see Fig. 1. The dotted lines represent the rows of plants, and *a*, *b*, *c*, and *d* the water furrows:—

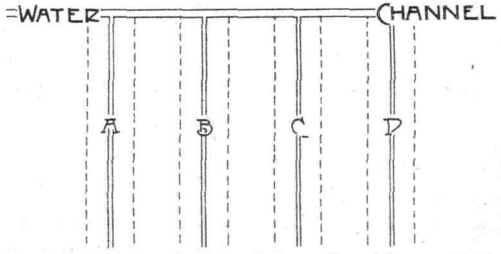


Fig. 1.

Where the rows run diagonally across the fall of the hill, a different method may be adopted. Bring the water along to the highest part of the bed, then get sufficient galvanized iron down piping, 3 inches in diameter, which is obtainable in 6-ft. lengths. Lay the first length with the mouth in the water channel, and butt another length on to the bottom of the first one, leaving a small space just sufficient for enough water to escape to run down the furrow. Continue on in the same way till you get to the foot of the hill. By using the down pipe down the steep part of the hill, it avoids the scour that would take place if a stream of water was run in a furrow straight down the hill. By moving the pipe

at each joint, you can regulate the supply for each furrow. See Fig. 2. Three-inch down pipe can be bought in Melbourne for about 1½d. per foot. As the water furrows are 6 feet apart, the 6-ft. down pipe is just the length.

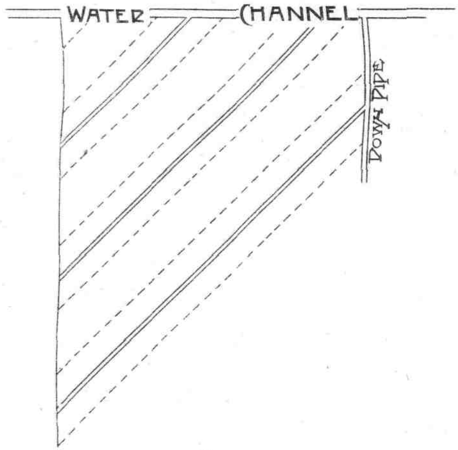


Fig. 2.

If the rows are very long, the top of the rows at the channel are likely to get too much water. If so, it would be better to do it in two sections. When the upper section has had sufficient water, another channel could be brought across the middle of the bed and the lower part watered in the same way as the first. In running the water down every second row, it leaves the other rows open to gather the fruit.

With regard to the most suitable varieties for planting, there is very little choice. The La Marguerite of French origin is one of the oldest varieties and is still the best for market purposes. Trollope's Victoria does well on stiff clayey ground and is very firm in the flesh and carries well; not so large, but later than Marguerite. Edith Christy, a Victorian seedling, grown by Mr. F. C. Christy, and named after his daughter, is an early variety of good size and flavour, rather pale in colour, and soft flesh; crops well. Uptutmark is a new variety, which originated at Doncaster, and is well spoken of in that district, having the character of bearing good crops all through the summer. The varieties Captain, Sharpless, Noble, and Royal Sovereign, do fairly well in some places, but are not to be depended upon.

In the early days of strawberry culture in this State, the varieties, the [illegible]s Surprise and Carolina Superba, gave immense crops of fruit, and selves.

should be

I question very much if the yields given by these varieties have been equalled since. It may perhaps be worth while for growers to give these old varieties another chance if plants can now be obtained. A great number of new varieties have been introduced from England and America from time to time; but none of them have proved of much value for market purposes; there is still an opening for some good new varieties of strawberries.

GARDEN NOTES.

J. Cronin, Inspector, Vegetation Diseases

The Delphinium.

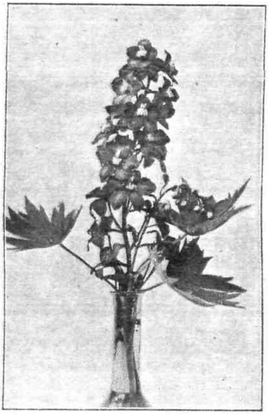
Delphinium, the larkspur, is a genus that includes annual, biennial, and perennial species, most of which produce flowers of varying shades of blue. The annual kinds, mostly varieties of *Delphinium Ajacis* (the rocket larkspur), and *D. consolida* (the branching larkspur), are hardy plants that are largely grown for sale and for garden decoration. They are very showy, and in addition to blue, produce flowers of pink, white, purple, and other colours, and double or single individual blossoms. The rocket varieties are said to contain a principle that is poisonous or obnoxious to certain insects, and are often specially planted in gardens in districts subject to invasions of grasshoppers as a check against their ravages. Seeds of the annual kinds should be sown in autumn.

The perennial kinds are worthy of general cultivation, particularly the florists varieties, of which those known as Kelway's hybrids are the finest. There are species such as *cardinale*, and *nudicaule*, that bear scarlet and crimson flowers, and *sulphureum*, the yellow flowers of which are used for dyeing silks in Syria, but it is on account of their beautiful shades of blue that Delphiniums are specially valuable as garden plants. The flowers are borne on spikes often 5 feet in height. The colours of the newer hybrids are almost indescribable, and embrace almost every possible shade of blue and purple. There are single and double flowered varieties. In addition to the greater variety of colour, the garden varieties are larger in spike and flower, and generally more floriferous than the parent species. They endure great heat without flagging in the least, if supplied with a fair amount of moisture, and in fact there is no flower grown in our gardens that can compare with Delphiniums in that respect.

CULTURE.

To grow Delphiniums well they should be planted in beds specially prepared for them; sheltered from rough winds, but not unduly shaded or close to large trees. They thrive best in a friable loam that has been deeply worked and well manured. Rotted stable manure is most suitable in such soils; a mixture of equal parts of rotted cow and stable manure for soils of a sandy nature. The plants need a fair amount of water during summer, and as little as possible during winter, so well drained beds are essential. The beds should be prepared during winter, and the

plants set out in spring, in rows about a yard apart, planting about two feet apart in the rows. The beds should be mulched early in the season, by which means strong plants are assured in one year, even without the application of much water. The stems are brittle, and one stake at least will be required for each plant. After the main shoots have bloomed they should be cut away unless required for seed (which should be saved from the main spike of the finest kinds only) after which the side shoots will flower. When the stem has finished blooming it should be cut to the ground, when other shoots will soon follow. Delphiniums are most effective in mixed borders, in which they should be planted well back from the edges.



"MISS GOWER" (*Kelway hybrid*)—*Single Variety—Bright Blue, with White Eye.*

"CAPT. HOLFORD" (*Kelway hybrid*) —*Double Variety - Dark Purplish Blue.*

PROPAGATION.

Old plants should be carefully divided in spring, leaving one or more crowns to each division. Small pieces even if not supplied with roots will grow into fair plants, but require more attention in watering and s cultivating. Delphiniums are easily raised from seed, which should be sown in autumn and winter in boxes or pans of fibrous sandy soil. A f succession of young plants will insure flowers during the whole of the casummer and autumn, the plants blooming a few months after the seed bearrown. Slugs and snails, if present, are sure to attack the young plants, less, Nrovision must be made to prevent their access to the young seedlings. not to be ch enemies are present, the seed may be sown in the open ground, n. In the eedlings transferred to their flowering quarters when about two the 's Surpnes in height.
selves.

Flower Garden.

During this and next month most of the horticultural societies in the State hold their annual exhibitions. The floral exhibits are becoming more popular each season, especially at fruit shows, the principal flowers shown being roses, dahlias, and chrysanthemums. Cactus dahlias especially are exhibited largely during March, and with roses and chrysanthemums are an important feature at the shows held in April. At most of the shows examples of high culture may be seen, and cannot fail to be of educational value generally. To be successful an exhibitor must pay special attention to his or her plants. The whole energy of the plants, excited by stimulants, must be devoted to the production of a few blooms. Often the stimulating process is overdone, and coarseness and lack of quality are the result. This is generally the case where the plants are over-vigorous with large foliage and soft shoots. Such plants should not receive any special "feeding" whatever, neither should poor and weakly plants be persevered with, as all the "feeding" possible will not cause them to produce good blooms. The plants that will produce high examples of culture under special stimulation, are those of moderate strength, carrying well-ripened shoots; and the lesson to be learned at our shows is that from trees of a like character the best examples of fruit are obtained. A liquid manure that is suitable for plants requiring such "feeding" may be made from Peruvian guano, used at rate of 1 oz. to two or three gallons of water. The weaker solution should be used when commencing to "feed" the plants, increasing the strength gradually. Once weekly is often enough to apply liquid manure, sufficient being given at each application to moisten the soil thoroughly. An occasional watering with soot water, prepared by suspending a quart of coal soot (tied in a piece of hessian) in 10 gallons of water, is beneficial, especially to the foliage, which must be maintained in a healthy condition to assimilate the plant food.

Daffodils and other spring blooming bulbs should be planted. The depth to plant should be regulated by the size of the bulbs; small bulbs, as Ixias, near the surface, say about two inches deep; larger to a depth of six inches.

Seeds of hardy annuals may be sown for early blooming, and spring flowering herbaceous plants, as primroses, increased by division of the crowns, choosing moist weather for the purpose.

Kitchen Garden.

If the weather conditions are favorable, plant out cabbage, cauliflower, and other vegetables, that will be required for winter use. If the plants of cabbage or cauliflower are infested by aphis or caterpillars, dip before planting in a solution of "Firtree oil." The "blight" and "grub," as these pests are usually termed, have been very troublesome in many places this summer, and it would be of little use to set out infested plants. Of several washes that were tried against cabbage aphis some years back, "Firtree oil" was in a very marked degree the most effective, in fact it was the only wash that was at all satisfactory. It is too expensive to use as a spray wash except on plants in seed beds, but used as a "dip" it is reasonably cheap, and was proved to be effective.

Seeds of various saladings, also turnip, cabbage, and cauliflower, should be sown for a succession.

SMALL YIELDS OF VICTORIAN VINEYARDS AND THEIR CAUSES.

François de Castella.

A large portion of the produce of our vineyards is destined for shipment to England. This market is at the greatest possible distance from us, and we have to compete against wines grown much nearer to it, and under more favorable conditions as regards cost of labour, as well as cost of transport. It is only by doing our utmost to maintain a high standard of quality, and at the same time by reducing the cost of production to the lowest possible figure, that we can hope to compete successfully with our more fortunately situated rivals in Southern Europe and Northern Africa.

One of the most potent means of reducing the cost of production is by increasing the annual yield per acre. It is evident that even a small increase in yield is absolute profit, if it can be obtained without any increase in the cost of cultivating the vineyard. I refer, of course, to a reasonable increase in the yield, and one that can be obtained without in any way impairing quality; by unduly forcing production, either by excessive irrigation or a too lavish use of powerful manures, quality might suffer; but we have only to compare our average Victorian yields with those of some of the choicest European vineyards in order to be convinced that there is ample room for improvement.

All practical vine-growers know that it frequently happens that an abundant vintage is noted for a high standard of quality. In our generous climate we have nothing to fear from a very considerable increase in the yield of our vines, for the reason that, in the majority of cases, their average yield is, at present, far too low.

No comparison is here intended with the abundant vineyards of the South of France, where yields of up to 3,000 gallons per acre are not uncommon. The type of wine produced there would be useless to us except, possibly, for distillation. Although suitable for home consumption were we a wine-drinking people which, unfortunately, we are not, they would be quite unfit for export.

Taking into consideration only the vineyards producing the choicer European wines, and planted with varieties which we have found by long experience to be suited for the production of the type of wine for which there is a ready demand in Great Britain, we are at once struck by the fact that with few exceptions our vineyards compare very unfavorably with them, so far as productiveness is concerned.

Now that Phylloxera is forcing many vinegrowers to consider whether they will abandon viticulture or re-constitute their vineyards with grafted resistant vines, this question of our small yields becomes one of vital importance, and we must do our utmost to see that nothing is neglected that may tend to increase the yields of our re-established vineyards. The consideration of the causes of these small yields is thus forced upon all growers who seriously face the question of re-constitution.

These causes may be divided into two main groups:—

1. Mistakes made in connexion with the establishment of the vineyard.
2. Faulty or unsuitable cultural methods.

At the present time of year it is the first group which interests us most. It will ere long be necessary to make up one's mind with regard to plantations to be made during the coming winter and spring.

Mistakes made in Connexion with the Establishment of the Vineyard.

Chief amongst these we have the following:—

1. Insufficient preliminary preparation of soil prior to planting.
2. Deterioration of the vine, owing to faulty selection of cuttings.

There are doubtless others also, such as selection of varieties unsuited to the climate or soil. Vineyards are sometimes planted in unsuitable situations, but these mistakes, though grave, are made by inexperienced growers and they only merit passing notice.

Insufficient Preliminary Cultivation.

Though, perhaps, the most important of the factors, this subject has been so thoroughly dealt with by Messrs. Dubois and Wilkinson in their introduction to the translation of articles on *Trenching and Sub-soiling for American Vines*, published in 1901 by the Department of Agriculture, that I cannot do better than refer growers to this excellent work. It will bring forcibly before them the difference between the methods we have followed in the past and those used in European wine countries. The translators especially insist on the greater need for *preparatory deep cultivation* in the case of grafted resistant vines, and refer to the many failures which in France resulted from neglect of this indispensable work. The grafted American vine demands far more attention in this direction than the ungrafted European. This point is now thoroughly recognised in Europe, and should not be lost sight of by Australian growers.

Deterioration of our Vines, Owing to Faulty Selection of Cuttings.

Little or no attention has been paid to the selection of cuttings by the bulk of our growers, more especially during the very active extension of the area under vines brought about by the bonuses given in 1890, and subsequent years. During this period, almost any part of a vine was looked upon as being good enough for the purpose. New chum viticulturists prided themselves upon the number of cuttings they could plant in a day, but paid no attention to their selection. An intending planter would order his cuttings from any vineyard proprietor who would supply him at a cheap price; this grower would allow his vignerons a few shillings per thousand for trimming, and making them into bundles, but their careful selection was the last thing that entered the head of either purchaser or vendor. The former could consider himself lucky if the cuttings were freshly removed from the vine, nor was the vendor always to blame for this; orders were often sent in at such short notice and so late in the season that there was no option but to execute them from heaps of vine prunings ready for burning.

If the percentage of strikes was fair, and the bulk of the young vines proved true to type, the grower congratulated himself upon having a well-established vineyard.

The results of such haphazard methods have been most serious, so far as the yielding power of our vines is concerned.

The importance of the most rigorous selection in every branch of agriculture, in order to improve breeds and varieties, whether of animals or plants, is universally recognised, yet nothing has been done in this direction in Australia, so far as the vine is concerned. There is not the slightest doubt that in very many cases the varieties or "cépages" cultivated, have absolutely deteriorated owing to reckless propagation.

The tendency of higher plants to "sport" is well known. It occasionally happens that a certain bud will suddenly, and without apparent cause, give rise to a shoot yielding leaves, flowers, or fruit differing in some particular from the type. If removed in the shape of a cutting this deviation is perpetuated, and we have a "sport" from the parent plant. Many choice varieties of roses have originated in this way, and in the case of vines and fruit trees this tendency has often been turned to useful account, in order to modify the size, or colour, or other qualities of the fruit. For example, the "Centennial" grape is a sport from the Waltham Cross.

We can thus perpetuate variations from type of a desirable nature, but undesirable characteristics are also perpetuated in the case of a cutting made from a faulty shoot.

All works on viticulture insist on the necessity of only making cuttings from canes which have borne fruit, the presence of a small piece of the previous year's wood at the base being recommended, as it indicates that this requirement is fulfilled, and the cutting is not merely a sucker off the old wood, or "gourmand," and thus incapable of having borne fruit. In the case of certain cépages, cuttings made from non-fruit-bearing suckers produce absolutely sterile vines,* and in every case the vine resulting from such a cutting is certain to be less prolific than one derived from a fruit-bearing cane.

It is evident that the haphazard propagation of so many of our vines, already referred to, is responsible for the planting of a large number of cuttings which were quite unfitted to produce a prolific vine.

It is only necessary to take a walk through almost any of our vineyards to be convinced of the truth of this. The difference between the yield of individual vines in a block planted with the same variety is striking. Some will bear a heavy crop of well-filled bunches; others, though equally vigorous and equally well pruned and cultivated, bear only a few bunches; on others again, the bunches, although numerous, are so badly filled, owing to the non-setting of many berries, as to be almost valueless. As a rule these differences are noticeable year after year, the vines which bear heavily in one season continuing to do so subsequently. It is evident that cuttings taken from inferior or unproductive vines will tend to reproduce the undesirable peculiarities of the parent.

In old vine-growing countries it has for centuries been customary to mark such useless vines at vintage time, so as to permit of their elimination and replacement with fertile ones. In the Moselle district of Germany it is usual for the grape pickers to break back the upper portion of the canes of all undesirable vines. Needless to say, vines thus treated are carefully avoided as cutting producers. They are gradually eliminated from the vineyard. In the older works on viticulture, published prior to the era of reconstitution on Phylloxera resistant stocks, grafting is chiefly referred to as an excellent means for the conversion of such useless vines into prolific ones.

* See Dr. Jules Guyot—*Etude des Vignobles de France*, Vol. II., p. 361.

Certain cépages are more liable to this deterioration than others. Take the "Syrah" for example, so largely cultivated in Australia under the name of Shiraz or Red Hermitage. In his standard work on Viticulture, Foex,* after recognising it to be one of the most valuable kinds, says, "It has, however, the defect of degenerating easily, and cuttings should be selected with the utmost care before planting. It is the diminution in the volume of the fruit resulting from bad choice of canes destined for its multiplication, and from (cultivation under) unfavorable conditions, which has given rise to the erroneous idea that there exist two races of Syrah; a large and a small."

The Chasselas is another sort which degenerates easily. There is scarcely a vineyard in Australia where one may not note great differences between the fertility of different vines in a block planted with this variety: certain vines never set their fruit properly, whilst adjoining them are to be found plants which produce, year after year, good yields of well filled bunches. I well remember when a boy, at St. Hubert's, Lilydale, accompanying my father, while, with a pot of paint and a brush, he marked any exceptional vines which he intended to use as cutting producers for future plantations.

Although all cépages do not deteriorate to the same extent, there is not one which will not benefit by careful selection, nor is there one of which unsuitable cuttings can be planted without certainty of disappointing results.

A few extracts from a striking article which appeared in a French periodical some years ago, dealing with this subject, may not be out of place.† The writer, M. Battanchon, points out the urgent necessity for carefully selecting the scions to be grafted on resistant stocks. After insisting on the need for stocks suited to soil and climate, and for proper affinity between stock and scion, he continues—"But it is upon the good choice of the scions—and this independently of the French variety employed—that the yield, and more especially the regular yield of the reconstituted vineyard, will depend in the largest measure."

He compares a large estate, where grafted rooted vines, purchased by the thousand in the open market, have been planted with every care and skill, with the small vineyard of a careful and intelligent vigneron, who does everything himself, and works his own stock. Though vigour of vegetation and careful cultivation are equal in each case, there is a considerable difference in the yields. In the big vineyard one sees every here and there, faulty vines, with few or badly set bunches, whereas in the small one there is not a vine which is not loaded with well filled bunches. He goes on to describe how the small grower achieves such good results:—"In the spring he marks the vines which come into leaf latest, in autumn those which have set their fruit best. . . Which are most productive, and which ripen earliest . . and this year after year. . . In this way he gradually eliminates everything that is indifferent or only passable, keeping only that which is very good, and it is solely from these vines, which combine the maximum of qualities of all kinds, that he cuts the canes which are to serve as scions. He even goes further. Before vintage he once more goes through the vines which he has marked, and

* See *Cours Complet de Viticulture.*—G. Foex.
† G. Battanchon in *Messager Agricole*, 10th January, 1903.

observes the shoots which bear most fruit. *It is only these shoots that he will choose.*"

According to M. Battanchon:—"It is only necessary to compare the vines reconstituted with due regard to this point with those where it has been neglected, in order to be so struck by the difference as never to forget it."

The importance of the careful selection of scions is so well recognised now-a-days, in France, that Messrs. Viala and Ravaz, in the valuable work recently translated by Messrs. Dubois and Wilkinson, express themselves as follows concerning it.*:—

"We need not insist on the selection of scions. They should only be cut from those canes which bear the most fruit, and from the most fertile vines. They should never be taken from young vines which have a tendency to produce wood instead of fruit, and which are never well lignified; nor from vines affected by cryptogamic diseases, which are always deficient in reserve material, and consequently incapable of forming much callus."

In conclusion, let us hope that reconstitution may not prove an unmixed evil, but that in leading to our re-established vineyards being planted on better prepared soil, and with vines rendered more productive by rigorous and carefully carried out selection, our growers may, in an increased yield per acre, find some compensation for the sacrifices forced upon them by the Phylloxera and the re-planting of our vineyards which it renders necessary.

THE MARKET FOR VICTORIAN PRODUCTS.

R. Crowe, Superintendent of Exports.

The following Table shows the Total Amount of the Imports into the United Kingdom of Products which are specially adapted for Production in Victoria.

During the Years 1904–1905 the Imports from outside Countries averaged £180,000,000 in value. Of this amount Victoria contributed 3 per cent. It will be seen that Great Britain presents almost an unlimited market for our produce.

Product.	Total Imports into the United Kingdom.		Imports of Victorian Production, 1905.	Per cent.
	1904.	1905.		
Grain and Flour (not including Rice)	£67,330,187	£68,730,352	£1,276,213	1.85
Dairy Produce	59,656,295	60,796,773	1,898,986	3.12
Meat	30,585,333	31,5 0,323	339,027	1.07
Fruit	11,822,464	11,913,127	69,054	.58
Wine	7,830,431	8,336,959	72,403	.86
Rabbits	780,737	835,929	267,860	32.04
Total Food Products ..	£178,005,447	£182,143,463	£3,923,543	2.15
Wool	20,366,030	23,821,359	3,376,015 (1904)	14.17
Tallow, Hides, and Skins ...	6,576,310	8,084,824	1,058,040	13.08
	£26,942,340	£31,906,183	£4,434,055	13.89
GRAND TOTAL VALUE ...	£204,947,787	£214,049,646	£8,357,598	3.09

* *American Vines—Their Adaptation, Culture, Grafting, and Propagation,* by Viala and Raxaz, p. 244.